RAILROAD GAZETTE

FRIDAY, MAY 29.

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Contributions.

English and American Passenger Cars.

LONDON, May 15, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have long been convinced that this is a great country, but I never appreciated the greatness of its hospitality till I learned from your correspondent C. Y. that it keeps cars specially for the use of American visitors. So, at least, I gather from his letter, for when we English folk travel between London and Liverpool, the first-class carriages are seated for three "on one transverse seat"; we should as soon expect to travel 16 a side as six, as happened to C. Y. Our third-class carriages are seated for five a side; but C. Y. was, he tells us, one of eight. Again, I say, he has had an experience that would not come to an Englishman twice in a lifetime. To me, at least, it has not yet come once.

As for fares, may I put the comparison this way?—First-class, between London and Liverpool, the fare is $7; between New York and Philadelphia, a good deal less than half the distance, it is $3 in the parlor cars. Our third-class fare is $4; between New York and Philadelphia the fare is $2.50 in the ordinary cars. For my own part, I would rather travel (for a distance such as that between London and Liverpool) in a Northwestern first than in a Pullman parlor car; in a Midland third than in an ordinary car on the Pennsylvania Railroad. That may be—no doubt is—a proof of my folly; but as the vast majority of Englishmen are equally foolish, and as Englishmen constitute the bulk of the passengers, surely English railroad companies may be forgiven if they decline to dragoon their customers into cars such as commend themselves to the superior American wisdom of C. Y.

W. M. ACWORTH.

Tests of Vauclain Compound Locomotive on the Pennsylvania and Lehigh Valley.

On May 9 the large compound consolidation engine built by the Baldwin Locomotive Works, under the Vauclain patent, for the Government of New South Wales, was started on a round trip over the Lehigh Valley and Pennsylvania railroads for a trial trip on heavy grades. Some little work was necessary to put the engine in proper trim, and a preliminary trip was made on the Reading road for this purpose. On May 13 the engine started from Sugar Notch, on the Lehigh Valley, to climb a grade twelve miles long, 96 ft. per mile, with 10-degree reverse curves. As the exhaust nozzles were a little too large the engine did not steam as well as she should; these were changed, and the engine worked satisfactorily. Five trips were made on this road, with the record shown in the accompanying table. Simultaneously a large Wootten engine was tested in the same service. The indicator diagrams taken from the compound showed that there must have been a decided saving, owing to the superior expansion in the compound cylinders. No such expansion could be obtained in any single cylinder of reasonable size, doing as much work per stroke.

On May 17 the test was commenced on the Pennsylvania Railroad, where the Vauclain was compared with a class "R" engine. The details are given in the table. The most interesting performance was probably that on May 18 when 40 empty cars were hauled from Altoona to Gallitzin, where the grade is about 90 ft. per mile for 12 miles, with sharp curves.

While we are not able to present to our readers the comparative data of the tests of this compound engine with the Lehigh Valley and the Pennsylvania simple engines we may say that the saving shown was approximately from 28 to 35 per cent. Allowance must be made of course for the fact that the Australian engine is just out of the shop and that therefore it can hardly be considered as in the best working condition. A comparison of the indicator cards from the compound with those from a simple engine doing work under similar conditions points to a considerably greater economy than that just stated.

During these tests there has been a specially good opportunity to determine the strength of the double crosshead which this type of engine has. At the foot of the heavy grade going west from Altoona with 40 empty cars, live steam was admitted to the low-pressure cylinders, and, as the cylinder ratio is 3 to 1, there was of course about three times as much pressure on the large piston as on the small one; yet there was no evidence of straining or bending the piston rod, crosshead or guide.

The results obtained exceeded the expectations of the Baldwin people, and, as may be imagined, they are well satisfied with the economy shown. The action of the fire was specially gratifying, as no sparks were thrown out of the stack during any of the tests, and there was no necessity for cleaning out the extension smokebox. The amount of smoke was very small compared to the average bituminous coal burner, and in general the results of this test accord with those which have been made on other roads with this type of compound, and furnish additional evidence of its usefulness in heavy freight-train work.

TESTS OF VAUCLAIN COMPOUND LOCOMOTIVE ON PENNSYLVANIA AND LEHIGH VALLEY RAILROADS.

Date.	No. of Trip.	Railroad.	No. of Cars.	Weight of Train.	Time Consumed.	Time Detained.	Running Time.	Coal Burned.	Water Evaporated.	Coal per car mile.	Water per lb. coal.	Coal allowed by R. R. Co. per car mile.	Locality.
1891.				Tons. Cwt.	Hour. Min.	Hour. Min.	Hour. Min.	Tons. Cwt.	Tons. Cwt.				
May 13	1	L. V.	29	257 10	1 20	0 20	1 0	0 17	6 16	5 4	8.00	.....	Sugar Notch & Fairview.
" 13	2	"	32	284 2	1 31	0 11	1 20	0 18	7 6	5.7	8.11	.....	Sugar Notch & Fairview.
" 14	3	"	32	295 14	1 11	....	1 11	0 19	6 18½	5.5	9.1	.....	Sugar Notch & Fairview.
" 15	5	"	32	295 14	0 50	....	0 50	0 13	6 11	3.7	10.6	.....	Sugar Notch & Fairview.
" 15	6	"	36	319 6	1 4	....	1 4	0 14½	6 17	3.7	9.4	.....	Sugar Notch & Fairview.
				Net Tons.				Lbs.	Lbs.				
" 17	7	Penn	E 50C / 90H	563-C / 1,022-H	8 0	2 33	5 27	11,800	80,925	2.7	6.8	4.6	Phila. to Harrisburg.
" 18	8	"	E 80	880	9 5	1 32	7 37	13,000	125,330	2.5	9.6	4.6	Harrisburg to Phila.
" 18	9	"	27	338	*	*	*	*	*	*	*	*	Altoona to Gallitzin.
" 18	10	"	40	404	*	*	*	2,950	20,900	12.3	7.0	.....	Altoona to Gallitzin.
" 20	12	"	65M / 60 H	2,483-M / 2,634-H	11 15	3 10	8 05	9,150	....	1.04	....	4	Altoona to Harrisburg.
" 21	14	"	66 C / 30 P	2,425.46 / 1,053-P	10 30	2 47	7 23	9,100	68,890	2.2	7.5	4.6	Harrisburg to Phila.

* No record; detained by other trains.

Frogs and Switches.*

The demand for high speed has increased the weight of rolling stock and both of these have called for smooth and safe track. Considerations of economy have caused all expenses of the motive power and maintenance of way departments to be curtailed, and it often happens that too much economy (so called) in one department necessitates many times its equivalent of expense to the other; as when the gauge and treads of wheels are neglected, resulting in great damages to switches and frogs. Likewise all parts of the track should be kept in good gauge, line and surface, so as to avoid needless shocks to the wheels, and when new patterns of frogs or switches are introduced they should be selected with reference to the rolling stock which they are to carry and not merely with regard to price.

The split switch or point switch is the form in general use at present, and it has superseded the older types known as stub, Tyler, Cook, White, Wharton and Bryant, because it is believed to answer the various requirements of safety, efficiency and economy better than any other pattern known. On its introduction the split switch was looked upon with little favor generally, chiefly because of the danger when running against its two points, which were held in place by elliptical or spiral springs in the head rod between the points. This fear was justified by experience very early in its career, and the switch is now made quite rigid in itself, the automatic action being provided for in the switch stand by spring or weights. It is needless for me to enlarge upon the advantages of this change. When the points are connected with an automatic stand the switch may be "run through" without damage to any of its parts, and the points will resume their original position automatically. Ordinarily the points are made 15 ft. long, planed so as to have a throw of 3½ or 4 in. at the head rod and spread 5 in. at the heel. Four tie rods are used to connect the point rails, which are carried on slide plates extending under the main rails, outside of which braces are provided to assist in maintaining the gauge. The great danger in the use of the split switch is due to the separation of the point from the main rail, so that a wheel in running against the point may go on the wrong side of it or "split it." The best practice is to secure a firm contact for the entire length of the planed part of the point rail, having the gauge at point and kick equal. But even then the tendency will be for wheels in passing to the side track to spread the gauge at point and kick, forcing the braces out; and then the danger is that the main rail will spring back to place and seem to offer a perfect contact, whereas a sharp flange or wide-gauge wheel would split or mount it. Among the devices for preventing this may be mentioned the short guard rail ahead of the point, which will bring the trucks in line, and the use of a tie rod between the main rails to prevent their spreading.

Steel-rail frogs are made in two patterns, known as rigid and spring, and have come into general use, to the exclusion of all others. The spring-rail frog makes the smoothest track and costs the least for maintenance, but it has serious defects, which have created much feeling against it. A badly-grooved tire will sometimes crowd the movable wing rail out so as to cause a derailment, and this wing rail is also likely to be raised above the level of the point by dirt or snow accumulating beneath it, thus lifting the wheel so high as to allow it to mount the rail. Various plans have been tried to overcome these defects, all more or less successful. A plate extending under the frog and wing rail carries a stop which prevents the rail moving more than 2 in. Guides are also used to prevent the wing rail rising above the level of the point. The rigid frog is made in several ways, known as plate, yoked, keyed and bolted. Each of these patterns has its advocates, and all are far superior to the cast-iron frogs formerly used.

With the introduction of split switches and spring frogs there was a marked decrease in the number of cracked and broken wheels, but the conflict which the rigid frog and its guard rail have with passing wheels continues to be a constant menace to high speed. With the gauge 4 ft. 8½ in. and flangeways at guard rail and frog 1⅝ in. and car wheels inspected by the maximum and minimum distances of 4 ft. 5⅝ in. and 4 ft. 5 in., the wheels have a play of ⅝ in. and the guard rail, point and wing rail are struck and pulled one way or the other.

Take a common example, cast-iron frog No. 12. The point will extend almost to the vertex point and the flange-way will be 2 in. at throat and 1¾ in. through the wing, which will be for a distance of 24 in. only; likewise a common rigid rail frog of the same number and 12 ft. long, with blunt point ½ in. in width. This will have flange ways 1⅜ in. at throat, and the same through the wing for a distance of 44 in.; then an abrupt turn, reaching 3½ in. in a distance of 9 in. This frog is often improved by making the throat 2¼ in. and giving the end of wing rail a 60 in. radius curve for a distance of 15 in. This curve requires no heating in making the bend. With this frog should be used a guard rail having a true curve, the flange-way being 1¾ in. for 12 in. opposite the point of frog and 5 in. at the ends. This will avoid heavy shocks to passing wheels. When running against the point of a frog so guarded, especially when the frog is on the inside of a curve, narrow-gauged wheels will strike the ball of wing rail at the throat with a sudden shock; glancing from this the opposite wheel will strike the guard rail near the centre, quite often starting the spikes, so that the rail is apt to cant when a wide-gauge wheel comes along, allowing it to strike the point of the frog. We often see ⅝ in. wear from these contacts. Theoretically the only part of a frog to be protected by a guard rail is the point, and if this is done for 6 in. ahead of the point it ought to answer; but in practice it fails by reason of the variation in the gauge of car-wheels and other irregularities; but the flang-way of 1¾ in. should not extend for any greater distance past the point than is necessary to confine the wheel, so that the tread will take the support of the wing rail while bearing upon the narrow part of the point.

To illustrate: Take a No. 12 frog, with 2¼-in. flangeway at throat, having here a flat curve to the wing rails for a distance of 12 in. ahead and 6 in. behind the blunt point of the frog. Then straight and on the line of frog with a 1⅝-in. flange way, widening in 38 in. to a flangeway of 2¼ in., so that where the point attains a width of 2¼ in. for the support of wheels the flange-way becomes 2 in. (the distance 38 in. will be less on frogs of greater angles), the wing rail having a true curve for 15 in., widening to 3½ in. at the end. This frog requires a guard rail 12 ft. long, with 3 ft. of 1⅝-in. flange-way opposite the point, widening to a flange-way of 2 in. in two feet each way; then curving to the ends where the flange-way is 4 in. Sufficient bracing should be provided so as to prevent the guard rail canting.

However carefully frogs and guard-rails may be designed and adjusted it must be remembered that the constant wear of the metal and the repeated blows which tend to roll or cant the guard rails will soon make a 2¼-flange-way where 1¾ in. is required. This creates the danger of wide gauge wheels striking the point.

DISCUSSION.

Mr. Forney, who, in the absence of the president, acted as chairman, asked for the experience of members in regard to the wear of wheels and of rails as affected by the difference between the radius between the wheel tread and flange and that of the corner of the head of the rail. Notwithstanding the vigorous discussion of this question a few years ago, there are now many rails with the corner of the head made of a radius as small as ¼ in., whereas the corner of the standard flange is made ⅝ in. radius. The result is that the corner of the rail is much sharper than the corner of the flange.

Mr. Mitchell, in answer to a question, said that the rail generally comes to be the same radius as the flanges of wheels, and he had often wondered why the rails were not therefore made of the same radius as wheels in

* A paper read by W. F. Ellis before the New York Railroad Club, May 21, 1891.

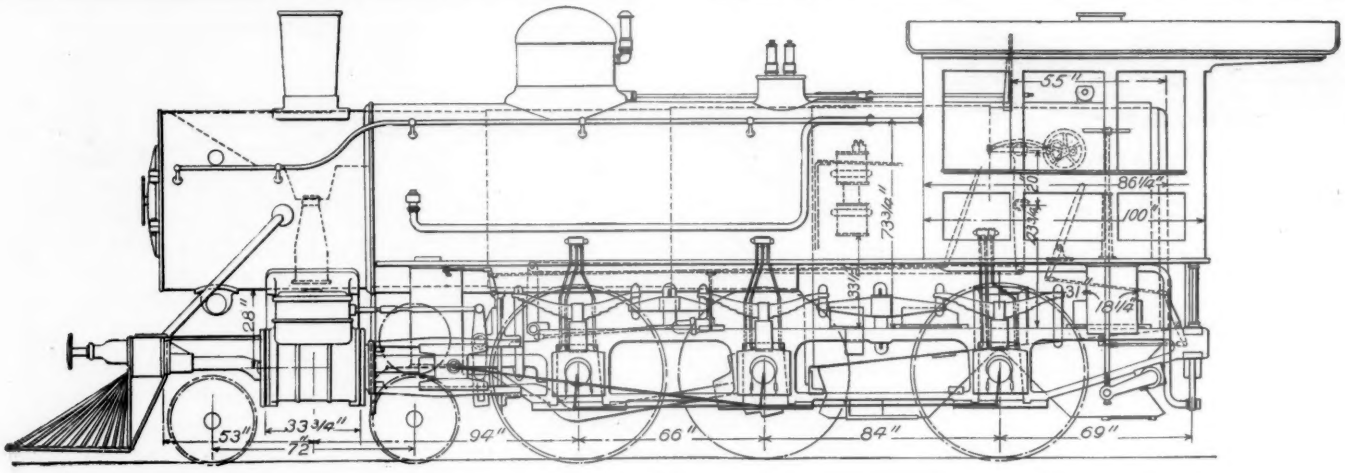


Fig. 1.

TEN-WHEEL LOCOMOTIVE FOR NEW SOUTH WALES GOVERNMENT RAILROADS.

Built by the BALDWIN LOCOMOTIVE WORKS, *Philadelphia.*

the first place. He had noticed that rails having such sharp corners soon showed a tendency to flow to the outside.

Mr. Ellis, in answer to a question as to how long a worn tread should be allowed to run, said that wheels would begin to do damage when the groove became ¼ in. in depth. While the fault is sometimes attributable to the maintenance of way department, which is compelled to continue defective frogs and switches in service, still ¼ in. should be the outside limit permissible. This refers particularly to driving wheels, the speaker believing that car wheels do comparatively little damage as compared with engines.

Baldwin Ten Wheelers for Australia.

The Baldwin Locomotive Works has just finished a large order for 10-wheel engines for the Government railroads of New South Wales, the general design of which is shown by the accompanying cuts, figs. 1, 2, 3, 4. An examination of this design and the exrract from the specifications given with this will show what alterations in American design are needed to meet the requirements of roads that are under English management.

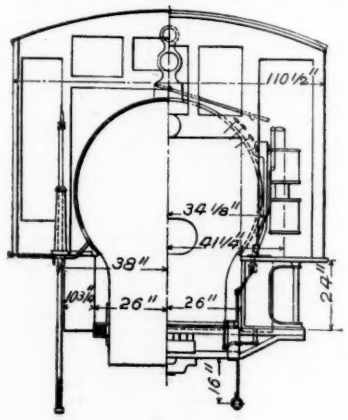


Fig. 2.

The clear height and width is much restricted. This compels a short smokestack, a low dome and the flattening of the cylinder flanges and casings, as shown in figs. 1, 2 and 4. The three safety valves have to be placed on the barrel of the boiler, instead of on the dome as usual. The screw reversing gear and the hand brake of the engines on the fireman's side of the cab are shown in fig. 1. A novelty in guide yoke is shown in fig. 3.

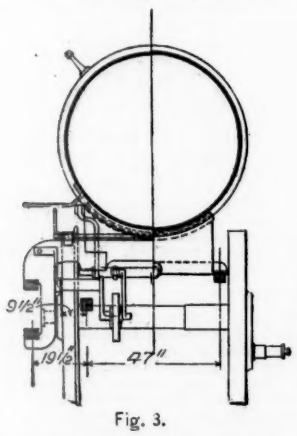


Fig. 3.

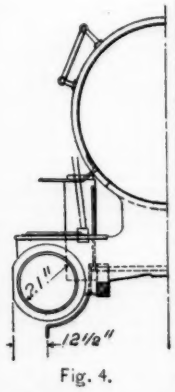


Fig. 4.

These engines are not unlike those which the Baldwin works has built for the heavy passenger service on the Piedmont and Cranberry grades of the third division of the Baltimore & Ohio between Keyser and Grafton, W. Va., the difference being mainly in the weight, cylinders and boiler, the Australian engines being lighter than those for the B. & O. Following are the general dimensions:

Gauge, 4 ft. 8½ in.
Maximum width of engine, 9 ft. 6 in. at cab and 9 ft. 3 in. at cylinders.
Sharpest curve of track, 528 ft. radius.
Maximum grade, 176 ft. per mile.
Cylinders, 21 in. × 24 in.
Weight, empty, 112,000 lbs.
Weight, loaded, 130,000 lbs.
Weight on drivers loaded, 97,500 lbs.
Weight of tender empty, 33,000 lbs.
Weight of tender loaded, 72,000 lbs.
Diameter of drivers, 61 in
Wheel base, total, 23 ft. 4 in.
Wheel base, rigid, 12 ft. 6 in.
Fuel, bituminous coal.
Heating surface, tubes, 1,821½ sq. feet.
Heating surface, firebox, 105 sq. ft.
Heating surface, total, 1,926½ sq. ft.
Steam pressure, 160 lbs. per sq. in.
Firebox 120 × 33½ in.
Diameter of boiler at front end, 62 in.
Boiler made straight top with radial stays.
Radial stays and stays in sides of firebox are of copper and 1 in. in diameter.
Shell of boiler is of steel $\frac{9}{16}$ in. thick, riveted with 1-in. rivets.
Firebox is of copper, ½ in. thick, except tube sheet, which is ⅞ in. thick.
Firebox arch supported on studs.
Tubes of brass No. 12 and 14, W. G., 270 in number, 2 in. diameter and 13 ft. long, fitted into rear tube sheets with steel thimbles and expanded in both tube sheets.
All steam pipes and branch pipes of copper ¼ in. thick, 7½ in. diameter inside.
Smokebox, extended type with netting, deflecting plate, etc. Top of smoke-stack 13 ft. 6 in. above rail.
Cylinder lubricators, No. 8, Nathan's; steam ports, 19 × 1⅜ in.; exhaust ports, 19 × 3 in.
Injectors, Sellers No. 10½, 1887 pattern.
Tires, of standard steel 3 in. thick.
Driving-axle journals, 8 in. diam., 8½ in. long.
Truck-axle journals, 5 in. diam., 10 in. long.
Truck wheels, 30 in. diam., cast-iron centres, with steel tires.
Boiler and dome lagged with asbestos.
Brakes: Westinghouse automatic air-brake on all driving and tender wheels; also screw hand-brake for engine and tender, all brake-shoes of the Ross pattern.
Tank capacity, 3,600 gallons.
Tender wheels, 36 in. diam.; tender journals, 4 × 8 in.
Piston-rod and valve-rod packing, U. S. metallic. Engine and tender equipped with spring buffers and draw-hook of the Turton type.

Shop Notes.

ST. PAUL.

At the Chicago, St. Paul, Minneapolis & Omaha shops they are improving the machinery appliances somewhat, with a view to turning out more accurate work, while at the same time reducing expense. The tool-room has a Brown & Sharpe milling machine which is rapidly paying for itself in the quality of the work done. For rail cutting, the slow-moving hard circular saw with short teeth is used. The saw is about 20 in. in diameter and can be fed through a rail very rapidly, making a much better finish with water than the high-speed, soft, toothless saw. An emery grinding-machine for grinding guides has been used here for several years with very satisfactory results.

Extension-front ends have been in use on this road for some time, the netting extending over the nozzle and back to the baffle plate. This latter is perforated with holes about $\frac{5}{16}$ in. in diameter and gives the gases a chance to pass directly from the flues up through the netting without the whole volume of the gases being obliged to deflect down to the bottom of the front end. In this way there is more opportunity for the cinders to lodge at the bottom and not be kept dancing around by the sweep of the gases as is the case in the common form of end. Some of the engines have short petticoat pipes.

Several engines bought recently are of the ten-wheel type and weigh about 55 tons. These are larger than any heretofore used on this line. The 3,300-gallon tanks now being built by this company are of similar construction to the old smaller tanks, being simply a few inches higher, sufficient to hold the additional water.

A stroke of economy on the part of this road has been the making over of several old 14-in. eight-wheel engines into four-wheel switchers. After taking off the pilot and removing the forward truck it became necessary to cut up the frames and move the position of the driving boxes. Also while making the change it was decided to have the cylinders 15-in. bore. The boilers are, however, left intact and will probably keep out of the scrap heap for a number of years.

The roundhouse contains 30 stalls, and occupies three-fourths of a circle. The entering track through the unused quarter has just been supplied with a well-built 26-ft. cinder pit about 12 ft. wide, built with brick walls and floor, and the rails laid on top of trusses obtained from the dismantling of an old bridge sent in from the line to be scrapped, thus utilizing material worth scrap price only. The width of this pit makes it more convenient and better suited for the work than the ordinary style, and the extra cost is but slight.

An officer of these shops has designed a tender of novel arrangement which is not without interest. The outside sheet of the tank is built as usual, but the sheet between the coal bin and water compartment extends clear across the tank, so that the water is confined to the back portion entirely, the front being used for coal only. The side sheets of the front half are braced with angle iron sufficient to give the requisite stiffness. Two filling holes are shown instead of one; this convenience also allows free escape for the air when taking water. The back part of the tank is flat, allowing the water to run off. By the use of a low fence around the top of the pit the coal does not accumulate above the top sheet, but is kept by itself and requires no shoveling down by the fireman, whose aversion to this sort of work is so pronounced that frequently coal will remain back on the tank for months until it crumbles and becomes caked, and by retaining the moisture causes rust, which weakens the sheet considerably. This design of tank should cost less to build than those in general use, and, by having the trucks properly distanced, could, perhaps, be made to balance quite as well as many now constructed.

These shops, which were built about ten years ago, are the principal ones on the line, but are confined to engine repairs, the coach and freight-car work being done at Hudson, some 20 miles east of here. All new equipment is purchased, none being built by the road. The practice here conforms, of course, more or less to that on the Chicago & Northwestern, any good features existing on the controlling line being made use of by the motive power department here.

COVINGTON, KY.

The shops of the Chesapeake & Ohio, at Covington, Ky., were remodeled somewhat from the plant as purchased from the Kentucky Central. The work done here is on repairs only, new equipment being erected at Richmond or Clifton Forge. The 13-stall roundhouse recently put up is very light and airy, and has a concrete floor. The space on which stood the former house is now covered with tracks to be used for freight repairs, which had before been done on the opposite side of the freight yard, and at quite a distance from the shops.

There are several Rogers engines here with the old-style valve gearing, with the forward eccentric inside and ahead of the pin. The rod from the socket arm to the link block is carried from above the trunnion back over the axle and is bent down to the block. The valve stem is worked by a sliding block instead of by a pin in the end of the rod, and the whole valve motion is constantly getting out of order and causing expense for maintenance.

Cinders from the front ends on this road are expelled through a T-shaped arrangement with covers at each end held on by set screws. At the back is a double valve which may be operated so as to allow steam to enter and blow in one or the other direction, depending upon the wind and objects at the side of the engine. There is a

hand valve at the side of the front end just below the stack, by which steam may be turned into the blower or down into the cinder hopper.

The vestibule "F. F. V." trains on this line are heated by steam and lighted with electricity, the latter being supplied from a dynamo in the baggage car run by a small Brotherhood engine, taking steam from the locomotive. Each car has eight storage batteries of the New York accumulator make, which supply light for eight hours at from 66 to 72 volts. The dining-car, which seats 29 people with large and small tables, has a small electric fan which, at times, proves a source of much comfort without the annoyance of a direct draft. These diners are very heavy, some of them weighing as much as 106,000 lbs. They are fitted with the flexible rubber vestibule, which latter lasts about two months.

Pintsch lights have been put on a number of cars running in here, and are giving excellent satisfaction,and it is quite probable their use will be extended.

A machine put up in the smith shop a short time since for cutting flues, consisting of three disk cutters driven rapidly from the shafting above, the upper disk being screwed down by a hand wheel, is proving a decided success, the cutting of a 2-in. flue requiring a little less than four seconds. A tire-turning machine from the Pond Machine Tool Company is a new feature in the shop. The machine is low and has a very solid, strong appearanec. The large centre gear is cast open at one side and has a connecting clamp fitted over the two ends of this jaw, so that the axle may be rolled in and centred, after which this clamp is put on, thus completing the periphery of the gear. The wheels whose tires are to be turned are revolved from the centre disk by means of small jack blocking at different points around the circumference, so that a steady cut of considerable size may be taken on each of the two wheels. The driving power being from the centre instead of from one end and the work being so thoroughly blocked, it is possible to turn tires rapidly and well, the capacity being from two and a half to three pairs of tires per day. This point of rigidity and strength is coming to be appreciated as very essential in the designing of many shop tools; frequently the lack of it necessitates the taking of light cuts, while, were the machine properly built, much heavier cuts might be made and the work done so much the faster. The popular tendency toward lightening the various parts, though in general good, still may be and is frequently carried to excess. The present arrangement of the tools and pits here gives a good capacity for shops of this size and sufficient for any needs for the near future at this division point.

A German Stop Shoe.

Glaser's *Annalen* has a description of a novel wheel chock lately invented by W. J. Schumacher, of Koln, Germany. Its distinctive feature is the point of the chock which assists the ascent of the approaching wheel. This point is joined to the chock proper by a hinge. Chocks with fixed points are often thrown from the rails in consequence of an upward bending of the points after short use. To prevent this displacement strips are attached to both sides, which permit a longitudinal movement upon the rail, and a slight tapering of the

sole at the end opposite the point enables the chock to pass rail joints, even when the next rail is somewhat higher than the preceding one. The metal is wrought iron and cast steel.

The careful construction of the sole of the chock and its correct instep curve, causes it to move immediately without causing objectionable shocks and vibrations. This movement along the rail completely changes the rolling friction into sliding friction, which quickly absorbs the inertia of the car and brings it to a standstill. To prevent cars from running against the buffer post, or to stop the same at a specified point, chocks are placed at the proper distance, which are fastened to the rails by a special attachment.

Hawksworth's Staybolt Drill.

The hand drill which we illustrate in this issue is an ingenious and efficient device for drilling small holes of any description, but is principally used for putting short telltale holes in staybolts. This has been used at some of the shops of the Burlington road for several years, and has given great satisfaction. It was designed by Mr. Hawksworth, of the Burlington & Missouri River, in Nebraska.

A considerable portion of the machine is made of brass. The oscillating cylinder, *C*, has a 1¼-in. bore, and gives a 1½-in. stroke. The piston rod extends through a simple gland at each end, and also an oblong opening in the frame at *H*.

In pressing against the disk fastened to *D*, the rod slides in the sleeve *S*, and, as the arm *B* is secured to the end with a set screw, it will compress the spring and

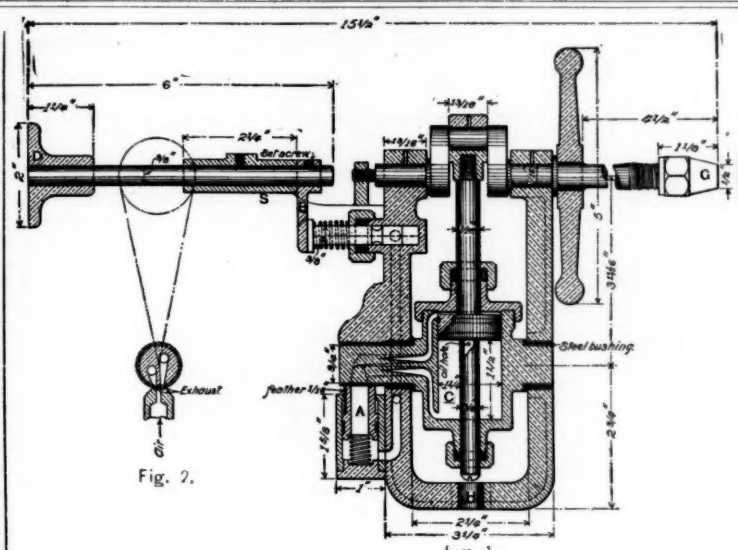


Fig. 2.

Fig. 1.

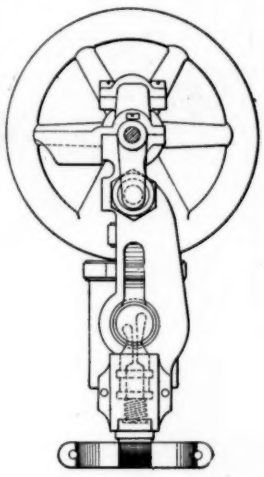


Fig. 3.

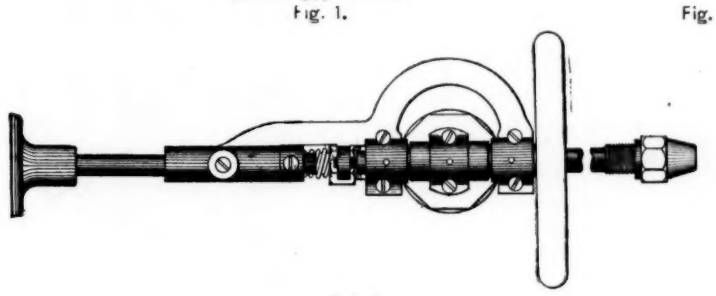


Fig. 4.

STAY-BOLT DRILL—BURLINGTON & MISSOURI RIVER RAILROAD.

move the lower end to the right, thus allowing the air to pass from an attached pipe into the port, and down through the $\frac{3}{16}$-in. hole in the casting, then up through the bushing, *A*, into the cylinder trunnion. This bushing is held up closely to the trunnion by the spring below. The sleeve, *S*, and the caps to the boxes, as well as the lug for a set screw for preventing end play in the shaft, are in a single piece. The lower frame is in two pieces, fastened together with machine screws, with the box containing the sliding bushing at *A* bolted on. The light flywheel is sufficiently heavy for this class of work, and is also used in starting the engine. The drill is inserted in the socket, *G*.

An interesting feature of the machine is the valve design shown in fig. 2. As the trunion revolves, each port passes successively the lower air port, admitting air to the cylinder. The exhaust air escapes at the side of the bushing *A*. Oiling is accomplished by the aid of the hollow piston rod with small holes drilled in the side.

There is a hose connection to the supply pipe at some convenient point in the shop, thus drawing from the main air reservoir.

This drill can make about 1,300 or 1,400 revolutions per minute, and one man can drill a $\frac{3}{16}$-in. hole, one inch deep, in 70 staybolts in a day of 10 hours. For a power breast drill this design is certainly good and meets the requirements of many railroad shops for boiler work and general repairs.

Foreign Railroad Notes.

The railroad department of the Swiss Government has issued a circular letter to the various branches of the Swiss Railroad Union, directing attention to the growing importance of standard methods and appliances in the railroad service, and to the good results which have already been achieved by their partial adoption. Stress is, however, laid upon the fact that in the permanent way of the various Swiss railroads there is still a marked dissimilarity owing not only to the older forms of construction, which are happily gradually disappearing, but to variations also in the practice of recent years. While the later methods are commended as tending to greater safety and general improvement in railroad management, prominence is given to the desirability of uniformity in practice among the different roads, and the officials are requested to take the matter under consideration, and to determine upon proper resolutions with this end in view.

Prizes have been offered by the *Verein für Eisenbahukunde*, of Berlin, Germany, for the best historical account of any part of the Prussian railroad system. The aim is to secure a history of the compiete system, but to lighten the task by thus dividing the work up into sections. The essays must be written in the German language and must be handed in on or before May 1, 1892. A committee of judges will be appointed by the society. The amount of money available for prizes is $500.

The *Machinen und Armatur Fabrik* at Frankenthal, Germany, are the makers of a condenser outfit for steam plants, the object of which is to use the condensing water over and over again, and thus avoid the usual expense incident to consumption of large quantities of water. Cooling of the warm water as it comes from the condenser is effected by exposing it to air currents, and practical trials are said to have given very satisfactory results. The machine works of Messrs. Burckhardt, at Basel, Switzerland, are stated to have one of the outfits in successful operation.

An electric underground railroad project is now being agitated at Vienna, Austria, with the view of affording increased accommodations for the constantly growing city traffic. As matters now stand the surface street-car lines are incapable of satisfactorily handling the business imposed upon them.

The *Illustrirte Zeitung für Blechindustrie* illustrates and describes a new form of ventilating device made by Emil Wille & Co., of Berlin, Germany, and intended specially for the ventilation of railroad cars. It consists of a movable sheet-metal pipe elbow, arranged on the roof of the car and fitted with a rudder vane, so as to keep the trumpet-shaped open end of the horizontal branch of the elbow turned against the wind. Direct communication with the interior of the car being maintained, it follows that a down draught of air into the car will be produced. The construction adopted is such, however, that the air flowing into the trumpet end may, by means of a flap valve, be diverted laterally, thus producing a partial vacuum in the vertical branch of the elbow, and accordingly producing an up-draught from the interior of the car, exhausting the vitiated air from it on the ejector principle. Simplicity, low cost and efficiency are claimed for the apparatus.

Electric Welding and Its Uses.

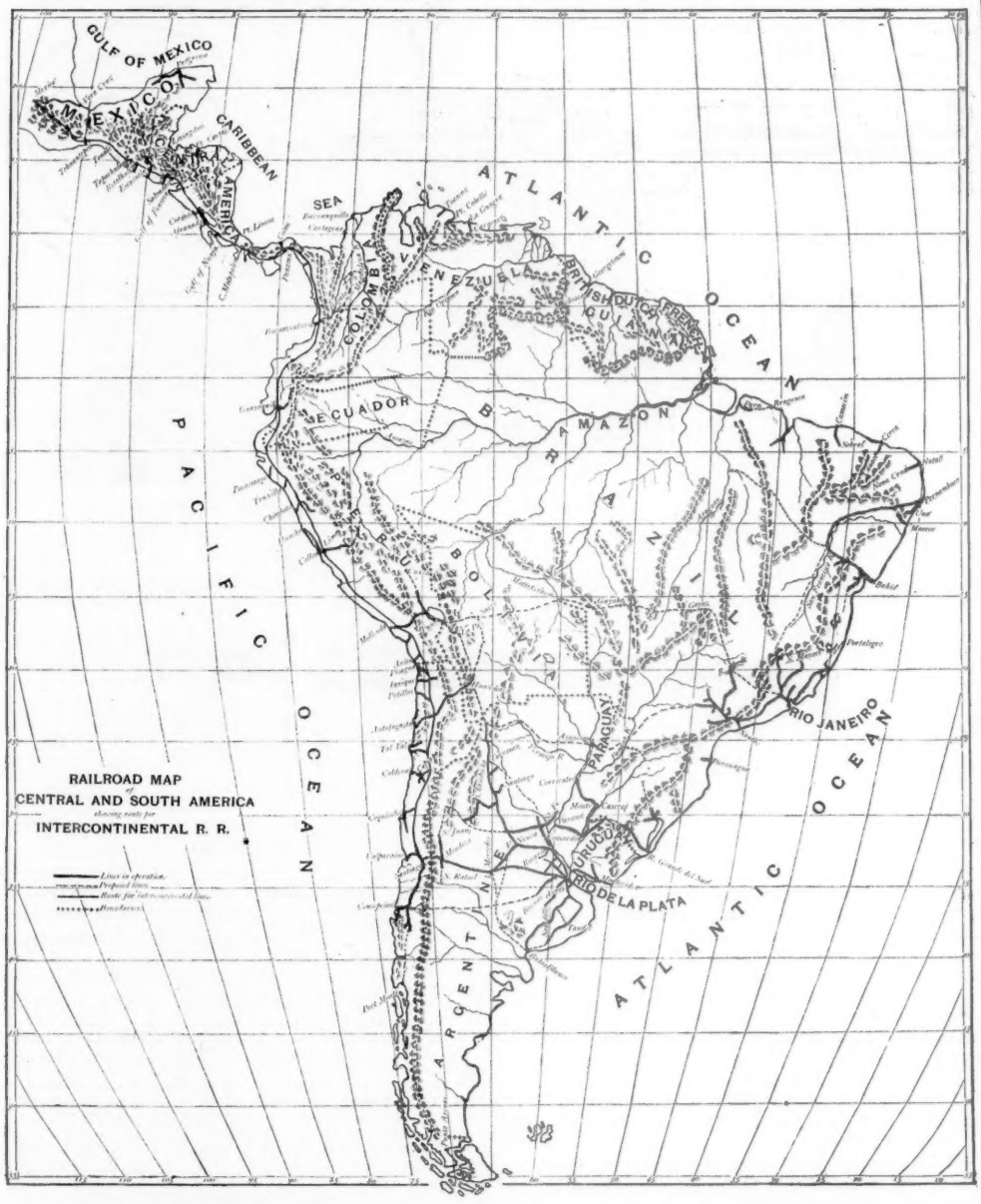
At the meeting of the American Institute of Electrical Engineers in New York last week Mr. Frederic A. C. Perrine read a paper detailing some of the now quite numerous uses to which electric welding plants can be put. Following is a summary of the facts given.

A plant used by the Roeblings, working at times 24 hours to the day and six days to the week, made some 370,000 welds in two years of use. A plant, comprising a generator capable of welding up to ½-in. copper (40,000 watts), one large transformer and seven small ones, ranging in capacity between No. 4 and No. 18 B & S copper, shows a daily record of over 1,000 welds in copper and iron wire. This plant is used for welding purposes in the preparation and packing of telegraph wire. In the welding of all sizes of wire below ¼ in. in diameter the ends are cut square across with a pair of pliers, and the edges of cuts set perpendicular to each other, touching only at the centre of each edge. For larger sizes the ends are filed to a true-face contact, and the circular edges chamfered off to provide against too great an enlargement at the burr. After a reheating in several clamps the burr of the weld is forged down to the proper diameter.

Messrs. Seward & Son, of New Haven, Conn., have a machine employed in uniting Norway iron to Swedish steel for such shapes as are required in carriage irons and fifth wheels. A drop hammer removes the burrs in the same heat.

The Pope Manufacturing Co. welds all its crescent tires for bicycles by the electric process. The material used is soft steel, and the tires are welded and formed in the same heat. As a new use, the Trenton Iron Co. is attempting to weld wire rope in its completed state to avoid the now troublesome and tedious splicing. The Hopedale Manufacturing Co. is welding spinning rings by the electric process. These rings, about 2½ in. in diameter, are formed from a piece of bar iron, welded and the burr reduced by the use of a series of dies. The rings are then finished, the whole cost being considerably less than when the rings were made from sheet metal.

Studebaker Bros., of South Bend, Ind., have now nine electric welding machines, one for welding steel axles up to 1½ in. square. The weld being made the axle is quickly transferred to a drop hammer giving some 300 blows per minute, where it is set, all ready for the market. These axles are tested by bending them while hot to an angle of 90 degrees and then back again to a straight shape. No axle as yet has been injured or found wanting by such test. The Studebakers have also two machines for welding large car ties of 4 in. width and ¾ in. thickness and under. The weld is made as usual, and the burr removed by the hammer. The two machines can keep one hammer in steady use. One welding machine is used on small carriage tires, 1 by ¼ in. and smaller. The burr is removed by a single blow of a hammer and the tire set to the felloe by compression instead of by the old shrinking method. Two machines are



used for hub bands, on which 1,200 welds are made each. There are also two or three machines for small miscellaneous work. The metals used are iron and low-grade steel. On this plant as a whole 360,000 welds have been made in six months of use.

The Johnson Rail Co., of Johnstown, Pa., has one machine in use for general work such as cannot be done by hand. In the results of one year's use of this machine, not one defective weld has been found.

In the agricultural machinery line the Electric Wheel Company, of Quincy, Ill., casts the hubs of malleable iron with spokes some 3 in. long. To the spokes are welded by one machine wrought iron extensions, and by a second machine these extensions are upset into the rim, which is itself welded into a tire, the result being a wheel in which the spokes cannot rattle loose at the hub.

Niles & Scott, of La Porte, Ind., form the hub into two parts of drop-forged low-grade steel, each being grooved to receive the spokes. One of the halves is placed on the base of an electric welder, the spokes laid in the groove, and the second half of hub placed on top and the clamp brought to bear. The current is then applied and the whole, spokes and hub, welded solidly.

The Rogers Typographic Company, of Cleveland, O., is cited as welding brass to steel, at a rate of 800 welds per day, in the manufacture of type setting and founding machines.

E. C. Atkins, of Indianapolis, Ind., has made valuable use of the electric welding in the repairing of circular saws and the replacing of broken teeth in finished saws. Formerly it was necessary, where a tooth was broken out of a saw in the finishing, to cut away all the other teeth and make a smaller saw, losing not only the difference between the cost of the large and small saws, but the entire cost of labor in cutting the original saw. At present when a tooth is broken out a new tooth is fitted and welded in place, a drop of oil being applied at the completion of the heat to restore the temper to a serviceable point. The same parties use the welding process for hand saws.

Pipe welding is another instance cited by Mr. Perrine, as useful in the manufacture of continuous coils for ice machinery, blast furnace tuyéres and radiators. Also extra heavy black pipe can be bent as well as welded by electric process, the former process having the clamps set wide apart to give room for the desired bending. For continuous spiral coils the forward portion is being bent to shape while a second or additional piece is being welded on, the time occupied for the welding not being of sufficient length to interfere with the bending of the leading portion.

In the manufacture of wire-wound ordnance the wire is welded by the electric process, and the joint meets all the demands of strength, etc. A welding machine for the manufacture of ship chains is now being constructed for government use in welding links up to 2 in. in diameter. The welding of shells and shrapnel for armor-piercing-purposes is mentioned by Mr. Perrine. The method followed has already been described in our issue of Nov. 7, 1890, in an abstract of a paper read by Lieut. W. M. Wood before the Society of Arts, at Boston.

The Pan-American Railroad.

BY F. W. CONN, C. E.

The project for a railroad to connect North and South America is beginning to awaken universal attention. That the construction of this railroad will be attempted in the near future is beyond doubt. Whether or not such a road would pay is, of course, an open question; but every one must concede that it would be of material benefit to the United States.

Any one conversant with railroad affairs in Spanish-America will tell you that all of the republics through which the Pan-American road will pass would give generous subsidies and concessions. It seems to me that the Inter-Continental Railroad, with government guarantees of six per cent., ought to be able to do business to the mutual benefit of the United States and her sister republics.

It is probable that these concessions could not be obtained without an option of government purchase, for government roads are the rule rather than the exception in these countries. This might interfere with the prospects of certain promoters and financiers, but it would not affect traffic. Granted that this road would pay—or rather, that it would pay to build this road—the next question to be considered is, what is the best route? The Inter-Continental Railroad is an international affair, intended for the benefit of all the American republics, and should be beyond the reach of manipulation and above the use of "irrigation."

Under these circumstances, why is not the shortest and cheapest route the best?

The first and most important object is to connect with the South American roads, and to deviate from the most direct route to tap any important city or section of country is not necessary. All that will come of itself, once we have a trunk line. The more feeders the better.

The route given on the map accompanying this article is compiled from a somewhat extensive knowledge of the country, gathered while doing railroad work, and is located with particular reference to the grade and cost of construction.

As this is to be a trunk line, expected to do an immense business, the question of grade is an important one, and the route that offers the lowest maximum gradient at the same cost of construction is the one that should be chosen.

Some of the most important cities in Central and South America are situated in the heart of the Sierras, with an elevation of from 5,000 to 10,000 ft. It would be useless to tap these places with the main line, at a greatly increased cost of construction and with heavy grades. Several of these cities are already connected with the seaboard by lines which would be crossed by the proposed route.

Some one not acquainted with the country might argue that the line should be located at a high elevation for the entire distance, thus passing through these places, and cite the Mexican Central as an example. High tablelands, like those crossed by the Mexican Central, are not found in Central America south of the city of Oaxaca. To attempt to locate a railroad the length of Central America in the mountains would involve an enormous outlay, entirely out of proportion to any possible traffic.

As to the comparative advantages of the Atlantic and Pacific sides of the main range for the location of a railroad, reference should be made to the map. The line on the Pacific side would be about 800 miles shorter between the city of Mexico and Panama than on the Atlantic side. At the low estimate of $20,000 per mile, here is a difference of 16 millions of dollars. Of course, the line on the Atlantic side could be shortened very much by cutting across the Peninsula of Yucatan, but this would be well nigh impossible. The country through which the boundary between Mexico and Guatemala runs is the roughest on this continent.

The Usumacinta River, which empties into the Gulf of Mexico, pierces the heart of this region, and has its headwaters within 100 miles of the city of Guatemala. It might look, on a map, as though this would be a good way for a railroad to get into Central America, but it is not. I started once from Sacapulas, in Guatemala, with the intention of going down this river to the gulf, but was obliged to give it up. The section of country through which the upper Usumacinta runs is called the Lacandone country, and is more unknown than the interior of Africa. In my attempt to float down to the gulf I got as far into this country as any white man has ever been, and I can give assurance that it is no place for a railroad. The Grand Cañon of the Colorado is no comparison.

That a line down the Pacific side of the Sierra Madres would be the shorter shows for itself, and I will attempt to enumerate in brief some of the other advantages of this line.

The Mexican Southern, now being constructed between the city of Mexico and the city of Oaxaca, will make the latter city the most southern point reached by continuous rail from the United States.

Between Oaxaca and Tehuantepec is a very rough country, which will prove the most difficult section of the whole route to build, and will require some good engineering, but, in justice to this route, let me say that it would be equally difficult to get out of Oaxaca toward the Atlantic side. A concession has already been granted for a road between these two cities. At Tehauntepec this route would cross the Tehauntepec railroad, which road, when completed, will extend from Minatitlan on the Atlantic to Salina Cruz on the Pacific.

From Tehuantepec to Panama, a distance of about 1,200 miles, the route presents no engineering difficulties whatever. Having been over a good part of it with instruments, I am confident that for the entire 1,200 miles the line can be located with a grade not to exceed 60 ft. to the mile. The line should keep from 30 to 40 miles from the coast, thus clearing the salt water marshes, which are a feature of this coast. There are no broken spurs of mountains reaching out from the main range, as there are on the Atlantic side. The continental divide is much nearer the Pacific than the Atlantic, and from the level plain of the coast, which is from 30 to 50 miles in width, the mountains rise abruptly. The line, by keeping on the inner edge of the plain, next the mountains would have the coffee lands on one side and the sugar plantations on the other, and would pass through most of the principal towns along this coast. These towns are located where the foot-hills meet the plain, and are distributing points for the interior. The distance from Tehuantepec to the Guatemalan boundary—some 400 miles—is already covered by concessions.

At Tonala construction has already begun, and there are some 30 kilometres in operation. The same company has a concession for a transcontinental road to reach from Tonala to San Juan Bautista, on the Gulf of Mexico. The grading will be light with very little rock; what rock there is being volcanic, and not hard. Bridging will be quite an item, as there are numerous small streams liable to sudden overflow. Timber of all kinds is plentiful, but I have never seen wood that would stand the climate. Iron bridging put in from the first, will be found the cheapest in the long run. In Guatemala the topography is about the same, but there are not so many streams to be crossed. The route could pass through Retalhuleu and Escuintla, both places of considerable importance, but construction would be easier by leaving these places eight or ten miles to the left. As they are both connected with the coast by rail this would not matter.

Retalhuleu is the centre of the largest coffee district in Central America, and is the distributing point for Quezaltenango, San Marcos, Huehuetenango and Solola, all cities of some size situated at an elevation of about 8,000

ft. The railroad from Retalhuleu to the port of Champerico is earning 20 per cent. dividends.

Escuintla is on the Guatemala Central Railroad, which reaches from the port of San José to the capital, a distance of 71 miles, and is the centre of another coffee district. All business with the interior of Guatemala must be done through one of the above described towns. Each north-bound steamer of the Pacific Mail—there are five each month—for the last three years has brought from 300 to 500 tons of freight for San José, and perhaps two-thirds as much for Champerico. Of this freight there have been probably 20 tons per steamer from New York, the rest being from Europe. Two lines of German steamers that visit this coast during the coffee season are always loaded to the hatches with merchandise from Germany. The down boats from "Frisco" bring considerable wheat and flour.

From Escuintla to the boundary of San Salvador, the line would traverse a comparatively uninhabited country, covered with dense forests which contain all sorts of dye-woods and several varieties of mahogany.

In San Salvador the topography is somewhat different. The coast line is bold and rocky, and the country between the beach and the foot-hills more broken. The line taps Sonsonate (which place has a railroad running to the port of Acajutla) and the capital. C. P. Huntington holds a concession for a line from the boundary of Guatemala to the city of Salvador, which would constitute a portion of the All-American line.

In Honduras the line skirts the Gulf of Fonseca, passing through Amapala, the port of entry for Tegucigalpa, the capital, and the first good harbor on this coast south of Acapulco.

In Nicaragua the coast line becomes low and swampy again, but the route has only to keep inland far enough to find good going. About 70 miles of the Nicaragua Railway can be utilized. The route strikes this line at Chinandega, and could use it through the city of Leon to Monotombo, on Lake Managua. From here to Managua, on the same lake, there is a gap that would have to be built; then there is another piece of road that could be used from Managua to Granda, on Lake Nicaragua.

From Granada the route follows the shore of Lake Nicaragua until the location of the canal is crossed, and then bears away for the head of the Gulf Nicoya, and follows the north shore of the gulf to Punta Arenas. Here the Costa Rica Railway is crossed, which road is nearly completed and reaches to Port Limon, on the Atlantic, via the capital, San José.

It is not the purport of this article to speak of the wonderful fertility and productiveness of Southern Mexico and Central America, as I have attempted to confine myself to a description of the railroad route which I recommend, but I cannot refrain from stating that this country will raise anything that is grown in any other part of the world. This is not surprising in a country where vegetation is abundant from the beach to an elevation of 13,000 ft. I have seen exposed for sale in the same market, russet apples and pine-apples; barley and cotton; wheat and rice; white pine and mahogany; Irish potatoes and yams; guavas and cranberries; Peruvian bark and fir balsam; strawberries and breadfruit; crab apples and bananas; dressed cat (domestic) and young alligator; beef and monkey; natural ice and red peppers, all produced within a radius of 100 miles.

From Punta Arenas to the boundary of Colombia there is no material change. There will be some heavy work crossing the head of the peninsula which terminates in Cape Matapalco, and then the line continues down the north shore of the Gulf of Dulce into Colombia. From here to the city of Panama the coast plain is narrow, and there are some rocky points reaching to the coast.

Of the entire distance, from Oaxaca to Panama, which I estimate as 1,500 miles, one-half is covered by concessions, and construction has begun in several places. Railroad building in Latin America is as irregular as the irruption of its volcanoes, and when you read that construction is being rapidly pushed on a certain line, it does not follow that there is any probability of the road being completed during your lifetime. But it is no more than fair to assume that when the Pan-American railroad becomes a settled fact concessions that cover links in this important road will be greatly increased in value.

It may be claimed that a line at a higher elevation would tap more of the important cities, but I fail to see the necessity of climbing to an elevation of 8,000 feet to tap one city, and then dropping to an elevation of 600 feet to reach the next.

Of the route between Panama and Guayaquil I cannot speak with so much certainty, having never been over it, but I have been down the coast in a small boat which put in at the various small ports, and can say that the country looks the same, There is the same low swampy belt, varying in width, from which the mountains rise abruptly. There is, of course, a dense tropical jungle, which is green the year round, and looks very inviting from aboard ship.

From Guayaquil there is a short piece of road in operation, the objective point of which is Quito. One proposed route for the inter-continental line is located through this last-named city, but I do not think it feasible. It is something like 11,000 ft. above sea-level, and surrounded by some of the highest mountains on the continent. A branch from Guayaquil would answer the purpose, and could maintain a much heavier grade than is desirable on the main line.

The route we are discussing may not seem to help the east coast of South America, but I am advocating the shortest and cheapest line to connect with the present systems in operation. A line to Rio de Janeiro from the Isthmus means more than 3,000 miles of track over all sorts of country. The Amazon and many of its tributaries are navigable for deep-water ships, and if I am not mistaken it is not the object of the Pan-American road to carry the produce of the interior of the country to ships loading direct for Europe. Furthermore, such a line would leave the southern systems of railroad out in the cold.

Cuzco in Peru seems to be the objective point of the many proposed routes. We shall also reach Cuzco, but by utilizing a line already constructed.

South of Guayaquil the character of the coast changes; the table lands reach to the seaboard and are somewhat broken; rivers become scarce and are sunken below the level of the plain. No serious difficulties will be encountered, but a little more engineering skill will be required. The country is bare and there will be no grubbing and clearing. The soil is dry and sandy, and as it never rains, construction can be carried on every day in the year.

This description of the route holds good through Lima and down to the connection with the Mollendo & Arequipa Railroad, which point we may consider the end of the Pan-American road for various reasons which I will endeavor to give.

Chile has 1,000 miles of railroad in operation, and has a line located and under contract which is to extend to the northern boundary. The American Minister to Chili, Patrick Eagan, is authority for the statement that Chili will not only complete her system to the northern boundary, but will also help Peru to construct her portion of the intercontinental line.

The Mollendo & Arequipa Railroad crosses the divide to Puno and Cuzco, and connection with the Argentine system is already assured. The existing gap between Puno and Jujuy (the present terminus of the Argentine Great Western Railway) is about 400 miles. The gap between Jujuy and Huanchaca, on the Antofogasta Railway, is much shorter, and is now being constructed.

Observe that the most difficult portion of the route we are discussing, namely, the part through the Andes, is already in operation. This road cost $200,000 per mile, and even with a greatly increased traffic, as a link in the Pan-American Railroad, would hardly be troubled with a surplus. A concession has been granted for a line from Asuncion, in Paraguay, to a point on the Argentine Great Western, and the distance between Santos and Asuncion is covered by another. This would give communication with Rio de Janeiro in rather a roundabout way, it is true; but these lines are located through a fertile country and will give "Rio" direct communication with the west coast, so that in all probability they will be constructed long before a line to the northwestern part of Brazil. The route *via* Sucre, Matto Grosso, Cuyaba, Goyaz and Ouro Preto would be more direct, but I think the southern line will be constructed first.

The Oroya road in Peru reaches to the summit of the Andes, and is located to the head of navigation on the Ucayali, a tributary of the Amazon. Under the terms of the Grace-Donoughmore contract this road must be completed.

By means of this road, our route would tap that portion of the Amazon Valley not reached by ocean-going vessels. The Amazon and its tributaries have 50,000 miles of navigable waters, and the traffic is practically controlled by the Amazon Steam Navigation Co.—English—with a fleet of 30 steamers. There are several other companies and private owners with about 40 more steamers.

The only industry in the Amazon Valley of any present importance is that of gathering rubber. The rubber of the middle valley is better than that nearer Pará, and the Pan-American road ought to get some of this trade *via* Lima. Rubber is bought by weight, and the shrinkage is considerable, so that quick transportation would find favor with our merchants. The north coast of South America and the lower portion of the Amazon Valley are nearer New York by water than they can ever be by rail. While the Pan-American road might not be able to compete with water freights to the north coast, it certainly would shorten the time between New York and the southern and western portions of South America fully one-half. The construction of this line should not be delayed, for before long Rio de Janeiro will be connected by rail with Valparaiso, thus shortening the time between Europe and the west coast by 15 days, and making successful competition a more serious affair. Rates *via* the Isthmus are high, and New York connections are purposely missed. Freight can be shipped from New York to Valparaiso *via* Liverpool and the Straits of Magellan cheaper than by way of the Isthmus!

When certain mercantile firms of the United States attempt to establish a business with Spanish America they will doubtless be surprised to find that goods bearing their own brands are being sold for less than their cost of manufacture in the United States. For instance, large calibre "Smith & Wesson" revolvers, similar to those which sell in the United States for $20, can be bought there for $5. Shot guns, bearing the name of some of our best firms, can be bought for $1.50. The same is true of sewing machines. All these articles are made in Germany, and are of course of inferior material and workmanship, but find a ready sale for all that. The masses can afford only "Cheap John" articles, and foreign merchants manufacture accordingly.

It will be as well to bear in mind that the railroad under discussion is a line that will link together three zones, and that it will have two ends, that is to say, tropical produce will not only find a market in the United States, but in the temperate zone of South America as well, and that the latter country will be able to compete with us in several staples for the return traffic.

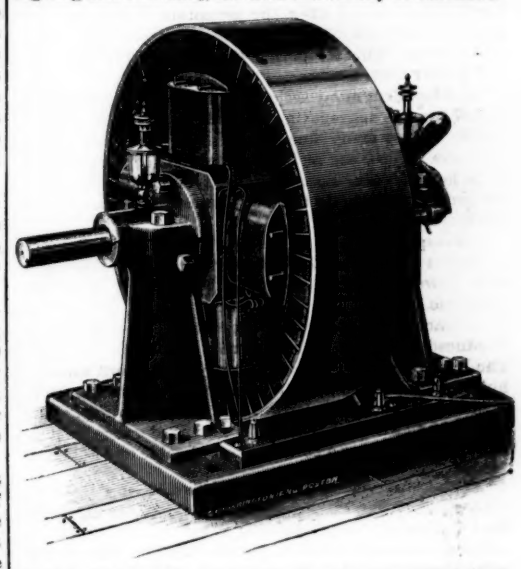
Capital follows railroads; and the introduction of sufficient foreign capital into Spanish America will put an end to the frequent revolutions and political disturbances which have been the principal cause of the non-development of the country. Give the people plenty of work, and raise wages to something better than twelve cents per day, and the numerous aspirants for political perferment will not find it such an easy matter to raise an army. Although Spanish America may not be "up with the times" the almighty dollar is duly appreciated. Show the large majority—ignorant barefoots though they be—an opportunity for making more than a mere existence, and they will soon cease to be led by the nose by any "Supreme Ruler" or "Military Dictator."

While the United States may be the father of the Pan-American Railroad, it must not be forgotten that the different Republics which stand ready to grant generous concessions are the most interested parties. Let it also be remembered that European nations have a well established hold on Spanish America and that this hold is getting stonger every day. It may not be patriotic to doubt our "most eminent statesman" when he speaks of "the trade of Spanish America belonging to the United States," but to my mind it belongs to the country which bids highest for it, and we seem very well "protected" against it at present.

CONCORD, N. H., Feb. 23, 1891.

A New Electric Motor.

Quite a novelty in the electrical machinery line is now on exhibition at the headquarters of the Simplex Motor Co., Boston, Mass., of which the accompanying cut is a representation. It is a new multipolar machine in which the armature revolves about the field. The armature is enclosed within and attached to a heavy supporting ring and encircling the field can readily be extended



to any diameter or be made of any width, thus providing for any extent of initial force. The fields are of laminated sheets, and being enclosed within the armature can be made of a compactness in construction and lightness of weight not yet equaled. The machine being of a multipolar type, it has to make only from one to six or seven hundred revolutions per minute, thus reducing the friction, wear and tear and necessary attendance. The coils are well ventilated and the possibility of burning out is reduced to a mininum. The magnetic circuit is quite short, calling for less wire for energizing as well as for less of a current.

The armature being circular it may be applied after various methods and for varying results. It may be made a portion of the wheel for traction effects; it may be suspended from a vehicle and directly connected to the axle for operation, or being attached to any revolving portion or fly-wheel of an engine or power transmitter, may be made to act as a generator. The claim is made for this motor that owing to the direct transmission of power possible, and its freedom of action, it may be specially effective on grades, and also that it may overcome or rather meet a defect quite damaging to present electric propulsion, namely the demand for a

maximum of power at starting, which is not necessary at any other time. The motor on exhibition is rated at 7½ horse-power, and plans are being made for one of 50 horse-power.

Annual Convention of the American Society of Civil Engineers.

Those of the Society who started from New York and vicinity went mostly by a special train which left New York at 10 a.m., May 21, by the New York Central & Hudson River. The train went by the Lake Shore to Cleveland, by the Cleveland, Cincinnati, Chicago & St. Louis to Cincinnati, by the Cincinnati Southern to Chattanooga, and by the Chattanooga & Lookout Mountain to Lookout Inn on the mountain.

There were about 40 members and their guests on the train when it reached Cincinnati, and probably 60 when it reached Chattanooga Wednesday evening. The attendance increased to a total of about 150 by Thursday night.

The run was without special interest or incident until Cincinnati was reached, although the special train passed the scene of the dynamite explosion on the Hudson River only about half an hour before that disaster.

From Cincinnati to Chattanooga the journey was made entirely by daylight and to most of the party it was new territory and full of interest. Mr. G. B. Nicholson Chief Engineer of the Cincinnati Southern, Messrs. T. D. Lovett and G. Bouscaren, former chief engineers, and other officers of the road, accompanied the train and Mr. Nicholson's car was attached, giving additional chance for observation. A capital discription of the road, prepared by Mr. Nicholson, was in print and distributed to the party, with a fairly good map and profile. The beautiful blue grass country of Kentucky and the rugged mountain scenery of Tennessee, and the very important historical associations of most of the country passed through combined to make the journey one of extraordinary interest. To engineers, the Cincinnati Southern was of unusual professional interest. The most important single structure is, of course, C. Shaler Smith's famous Kentucky River Bridge. The train stopped there, and many walked across. Those who had not been there before were unprepared for the boldness of the river gorge, of which the published pictures give no conception. The towers, designed and built in 1851, by Col. Julius Adams, under John A. Roebling, stand today in the excellence of their masonry and the beauty of their lines, a monument to the skill and cultivated taste of the engineer. They serve no other purpose now, but the reader who has access to a volume of the *Railroad Gazette* for 1878 can see there how they were utilized by Smith in his bold and original mode of erecting.

Another point of interest is tunnel 17, which was burned out in 1889. Accounts of this can be found in the *Railroad Gazette*, Feb. 16 and March 22, 1889.

A line was built over the summit in six days, and the traffic was carried over the mountain three or four months while the tunnel was being cleared of débris and relined. This temporary line was 6,000 ft. long and had 4.9 per cent. grades.

The line offers many serious problems in location, and has 27 tunnels aggregating five miles in length. There are on it also many fine examples of iron bridges and viaducts. These are 79 in number and aggregate 28,307 ft. in length. Mr. Bouscaren built many of them, and did much in their design to advance American bridge practice.

It was quite obvious in passing that the maintenance of way is far behind the engineering on this line. For this, however, the engineering department is not responsible.

The party reached Lookout Inn on Lookout Mountain Wednesday night, about two hours behind the schedule. The Inn is a handsome building of the modern summer hotel type, situated on the top of the mountain, commanding magnificent views over a vast country. It is reached by two railroads, one a standard gauge switchback, and the other a combination of cable and adhesion lines.

THURSDAY'S SESSIONS.

The Convention assembled at 10:55 a.m., May 21, President Chanute in the chair.

The new constitution does not provide how the Nominating Committee shall be appointed, but simply that it shall be appointed at the convention. The first business of the convention was to appoint a committee to present a plan. This committee consisted of the President, Secretary, Past President Shinn, Mr. Brush and Mr. Bouscaren. This committee made its report Saturday morning, but we will give the result here and close that part of our report.

Nominating Committee.—The report of the Committee appointed to recommend a plan for appointing the Nominating Committee, as slightly amended and adopted, was in effect as follows: The membership was divided into seven districts, the figures showing the membership in each district, (1) New York City and 50 miles around, 265; (2) New York State, New Jersey, Delaware, Canada and other countries, 154; (3) New England States, 131; (4) Pennsylvania and Maryland, 162; (5) Michigan, Ohio, Indiana, Illinois and Wisconsin, 145; (6) Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Montana, Wyoming, Colorado, Utah, Idaho, Washington, Oregon, Nevada and California, 178; (7) Virginia, West Virginia, North Carolina, South Carolina, Alabama, Mississippi, Louisiana, Florida, Texas, Tennessee, Kentucky, Indian Territory, New Mexico, Arizona and Arkansas, 108.

The members present in Convention from each district to present three names; the Convention to vote on those names, and the candidate from each district receiving the most votes to be the member of the Nominating Committee for that district. This was done, and the following elected: (1) Mr. Brendlinger, (2) General Field, (3) Mr. Manley, (4) Mr. Metcalf, (5) Colonel Merrill, (6) Mr. Lincoln, (7) Professor Landreth.

The amendment to the committee's report provides that the directors be requested to issue to the members in each district, before the Convention, blank ballots for members of the Nominating Committee; and that the three names receiving the most votes in each district be presented to the Convention, and the Convention elect the Committee from the names so presented. Of course, it is understood that the action of this Convention has no other effect on a future convention than that of mere recommendation and precedent.

We resume the report of Thursday's sessions.

The first paper was by Mr. Wilson, of Washington, on "American Irrigation Engineering." The paper is long and thorough, and brought out considerable discussion, and those who were at Cresson last year will remember Mr. Wilson's ready command of facts and accurate knowledge of his subject.

At the afternoon session the first paper was by Mr. J. E. Greiner, on "The American Railroad Viaduct; Its Origin and Evolution." We shall give an abstract of this paper and the discussion in a later issue, when cuts can be prepared.

The next paper is given in abstract as follows:

FREE RAILROAD BUILDING VS. GOVERNMENT CONTROL, BY E. BATES DORSEY.

Under the head of Free Railroad Construction will be included all railroads that have been or can be built by individuals or companies, without special acts of Government, whether national or state. Under the head of Government Owned Railroads will be included those owned and operated by the Government; and under the head of Government-Controlled Railroads will be included all those that cannot be built without a special act of Government, as is the case with all English railways. In these the English Government has no direct or indirect ownership whatever, but owing to the great difficulty and cost of getting from Parliament special acts to build new lines, the present English roads have a virtual monopoly of the land transportation of the United Kingdom. It is needless to say that the roads make the most of this exclusive right, by charging freight rates that to Americans appear excessive, half of which would fill the hearts of our railroad managers with joy.

All that can be said in favor of government ownership or control of railways is, that it can regulate the freight charges and prevent excessive rates that would interfere with the industries of the country. Practically it has no such effect. The result of the writer's experience and observation is that the highest railroad freight rates in the world are in England and her colonies, where the railroads are either owned or controlled by the government; and the lowest rates are those in the United States, where there is free railway construction.

The following table shows some of the current freight rates in England, South Africa and the United States:

£1 = $4.80.	Miles of Haul.	Charge per ton per mile.		
		England.	South Africa.	United States.
		Cents.	Cents.	Cents.
Birmingham to London, hardware	113	*a* 5.85	.....	.....
Birmingham to Manchester, hardware	90	*a* 5.73	.....	.....
Stoke-on-Trent to Liverpool, pig iron	55	*a* 2.32	.....	.....
Birmingham (U. S.) to Pensacola, pig iron	280	.....	.....	*b* .50
Birmingham (U. S.) to Pensacola, coal	280	.....	.....	*b* .50
Merthyr (Wales) to London, coal	177	*a* .995	.....	.....
London to Oldham, cotton	188	*a* 2.56	.....	.....
Liverpool to Oldham, cotton	43	*a* 5.10	.....	.....
Cape Town to Kimberly, grain (domestic)	647	.....	*b* 3.	.....
Cape Town to Kimberly, iron.	647	.....	*b* 7.	.....
Port Elizabeth to Kimberly, grain (domestic)	485	.....	*b* 3.	.....
Port Elizabeth to Kimberly, grain (imported)	485	.....	*b* 6.	.....
Cape Town to Kimberly, grain (imported)	647	.....	*b* 6.	.....
Port Elizabeth to Kimberly, iron	485	.....	*b* 7.	.....
Durban to Biggarsberg—Natal, grain	231	.....	*a* 8.	.....
Durban to Biggarsberg—Natal, iron	231	.....	*a* 9.25	.....
Newcastle to Durban—Natal, coal	270	.....	*a* 1.50	.....
Average charge for all freight on Pennsylvania R. R. Division. Average haul	135	.....	.....	*b* .626

NOTE.—*a* = ton of 2,240 lbs.
b = ton of 2,000 lbs.

The railroad from Durban has many grades of one in thirty, and one summit of 5,155 feet above its initial point. The first part of the road is very badly located for cheap working. Coal on the railroad from Port Elizabeth and Cape Town costs from $8 to $12 per ton. All the railroads in South Africa are owned and operated by the Colonial governments; they are very well constructed and maintained, much better than the average of our American roads.

The leading English railways pay the following dividends on their ordinary shares:

	Per Cent.	
	1888.	1889.
London and North Western	7⅞	7⅞
Midland	6	6
Great Northern	4⅞	4⅞
Great Western	6¾	6¾
London and South Western	6	6
Taff Vale	5	5

This shows that the English railways pay very well when their great cost is considered, but the money is undoubtedly earned at the expense of home industries. This is seen very forcibly in the depreciation of farming lands during the last 25 years—since the wheat of our Western States has come into direct competition with the English farmer, notwithstanding that the first has to pay in many cases over 1,500 miles of railroad freight and 3,500 miles of freight by sea, while the last has only to pay railroad freight for less than 300 miles. Notwithstanding these great disadvantages, the American farmer competes so successfully with the English that he has depreciated very largely the value of English farms. If the English freight rates were in force in this district (eastern Tennessee), the iron and coal interest surrounding us, that is being so extensively worked under our low railway rates, could not exist; and in place of the busy mines and furnaces there would be only a few farmers raising enough food for their own support, shipping, perhaps, a little cotton, for nothing else could stand the heavy freight rates to the seaports.

In English South Africa all the railroads are owned by the government, and the evil effects of the state ownership can be readily seen. In order to get the necessary votes in the assembly to pass a bill authorizing the construction of meritorious lines, it has been necessary to build other lines that were not required and will not pay. To secure the required votes they must make an omnibus bill, including the different railroads proposed; following there in their railroad bills the same practice that we do in our river and harbor bills.

As an example of this the Cape Colony government railways of South Africa, operating 1,599 miles, which cost £14,282,766, earned in 1889 a net profit equal to a dividend of 5¾ per cent. on the total cost. The road from Port Elizabeth to Kimberley, a part of the system, 485 miles long, costing £4,300,000, earned in the same year 13¾ per cent. on its total cost. This branch transported large quantities of mining machinery and goods to the interior for the diamond and gold mines. This branch shows the remarkable receipt of over $17 for each ton of freight handled, which the author believes to be unequaled on any other road.

As the government and railroad officers wish to make a good financial showing, they are obliged to charge high freight rates on the good lines, to make up for the loss on the poor ones. This has caused such high freight rates as to be nearly prohibitory to farming except near the sea coast. Diamond and gold mining, sheep and ostrich farming are the only industries developed in the interior that can stand the high freight charges. The government will not grant permission to construct private lines, for fear of competing with and injuring the public lines.

Many reasons, such as republican government, free government, free religion, rich soil, etc., have been given as the cause of the great prosperity of the United States; but the real cause has been the law allowing free railroad construction. This has given the country much greater railroad facilities than it could have had otherwise, and the sharp competition has given such low freight rates, that the interior of the United States, notwithstanding its thousand miles of railroad freight, can compete successfully in Europe in its good products. . . .

If there was free railway construction in the United Kingdom, with new roads built, and run also, according to modern railway practice, these would by competition force the old roads to improve their rolling stock, and consequently reduce largely their operating expenses, thus enabling them to make large reductions in their freight charges, without interfering with their dividends.

Those who are working for state interference, control or ownership of railways, in order to reduce the freight charges, should travel and see what is being done in other countries, where the railroads are more or less controlled by the government; they would return convinced that railway facilities and freight charges in the United States, under our free railway construction laws, are by far the best and the lowest in the world. They should look into the financial condition of the offending road, when, if they can show large or excessive profits, it would be very easy to obtain capital to build competing lines—promoters and contractors being constantly on the lookout for such opportunities. The most dissatisfied granger cannot say that our railways are now paying unreasonably large dividends.

The author, after long and close observation in other countries, is of the firm conviction that the best way to reduce freight rates is to have free railway construction and its consequent competition; as it will give cheaper rates and greater facilities than can be had under government-controlled or owned railways.

There was very little discussion of Mr. Dorsey's paper. It was followed by

LONGITUDINAL BEARINGS FOR RAILROAD TRACKS, BY THOMAS C. CLARKE.

It is now admitted by civil engineers and other railroad experts that our American system of track which has done so well in the past, owing to its strength, elasticity and economy of first cost and maintenance, is now in a bad way, and must be modified in some manner to meet the ever-increasing weight of cars and engines. Our track is giving out at all points. Joints which did well under lighter loads now sink and allow rail ends to be battered down. Steel rails are not hard enough. Their heads crush, or the material itself flows under the heavy wheel loads.

A new danger has shown itself. The old form of spike can no longer hold the rails to the ties. The sinking at the joints makes the rails saw up and down, and loosens the spikes. Then the gauge spreads and the trains leave the track. This form of accident is becoming more alarmingly frequent every year. . . . The great weights on the rails, aided by the sawing motion above described, cut their bases into the ties, and destroy them sooner than they rot. Thus we have rails, fastenings and ties all failing together. What is the remedy? . . .

Cutting into the ties can be prevented by the use of metallic tieplates. This, while excellent in itself, complicates the problem of fastening the rails and ties together. In England the cast-iron chair on every tie is a good but expensive remedy. . . . The most radical change is the adoption of steel crossties. . . . Besides their durability, they have the merit of allowing the rails to be firmly fastened to them, and spreading of rails is prevented. But the sinking of the rail joints still causes the rail to saw up and down. As it cannot leave the tie, they both move together, and after a time get loose in the ballast. Also, the tie, being but a shallow piece of channel iron with flanges 2 to 3½ in. deep, has no stiffness crosswise. The wheel is only supported by a short length of the tie, and they bend down under the rails, assuming a shape with two bends down-

ward and one upward in the middle. This works the ties loose in the ballast, and from these causes it is difficult to keep a metallic crosstie system in good line and level. From the smallness of the bearing surface, the metallic crosstie track, under American wheel loads at least, not only sinks at the joints, but at each tie as it is passed over, making an uneven track longitudinally.

On considering all these matters, and personally examining a great many improved forms of track, it seems to me that the only radical cure of the difficuly is to return to the old form of continuous rail, and continuous bearing, improved to avoid those defects which experience has shown and made capable of being extended in dimensions and modified in material to meet the ever-increasing loads of the future.

The defects of the continuous-bearing system as formerly made are as follows: The early form of continuous rails was made of such soft iron that the bearing parts cut into each other and soon worked loose. This cannot occur with steel members of proper proportions. The rails rested on longitudinal timbers. These had to go down so deep that they cut off drainage between the rails. Also, it was difficult to unite them to the wooden crossties necessary to preserve the gauge. The great number of joints caused decay. For all these reasons the continuous system, although giving a very smooth track while new, soon got out of order, and was replaced everywhere by the wooden crosstie system, which was less expensive to make and far less so to maintain.

The radical, and, as I believe, irremediable defect of the crosstie system is its low joints. The rail itself is treated as a continuous girder resting on yielding supports and spliced at the joints. If the attempt is made to splice the joint within the rail depth, as by angle bars, it deflects on account of want of depth. As the joint goes down, the middle of the rail goes up. If we strengthen the joint by putting pieces below it, intended to be in tension, while the rail is in compression, thus converting it into a deeper form of girder, the necessity of allowing for expansion and contraction makes it necessary to use oval holes for the bolts. These allow the bolts to move longitudinally, and thus they do not resist the shearing strains, and hence do not prevent deflection. This form of joint works well while new, but after a while gets loose like the others, and low joints are found. The only way, in my belief, to absolutely prevent low joints is to place continuous-bearing pieces under the whole length of the rails, and breaking joint with them. The solid part of the bearer supports the joint of the rail, and the solid part of the rail bridges over the joint of the bearer, and, what is of the highest significance, a small amount of longitudinal movement or play between the upper and lower members will not cause deflection when arranged as described.

The requisites of a properly designed longitudinal system are as follows:

First.—The first is that the longitudinal bearer under the rail shall be stiff enough to transmit the load to such a distance, on each side of the wheel, as will limit the pressure to not much over two tons per square foot of bearing surface, without requiring excessive width. Experience has shown that a greater pressure than two tons per square foot will sink ties too deep into the gravel or broken stone.

Second.—The next thing is to attach the rails and bearers together by a form of fastening strong enough to resist all strains and shocks, and yet allow of freedom of the rail to expand and contract, independently of its bearer. It must also be held to its bearer, so that creeping of the rail on the bearer may be prevented, and that without any notching or cutting of the rail that will impair its strength. The rails must break joint with the bearers. The fastenings must be so made that the rails can be quickly removed and replaced by new ones without disturbing the bearers. The fastenings must be able to hold for a time a broken rail, so that it will safely pass the trains, and no system but the longitudinal can do this.

Third.—The bearers (and rails) should be united firmly together by light metallic gauge ties, placed near enough to properly preserve the accuracy of the gauge.

Fourth.—The bearers and gauge ties should be of such shapes as can be easily tamped with gravel or broken stone; as will stay in place vertically, laterally and longitudinally, and will allow of drainage to pass between them.

Fifth.—The system should be so planned that no difficulty of construction can occur at curves, either in alignment or elevation of outer rail. Also it should be so made as to easily join to the ordinary form of T rail at turnouts and switches.

Sixth.—Besides the obvious advantages which such a construction gives, there are two others: The upper rail can be made of a harder and better worked steel, while the bearer can be made of a softer and tougher quality of metal. Probably basic steel would do for this.

Owing to the rails being supported under their entire length by continuous bearers, they can be made of less depth and sectional area in their lower flanges than at present. The metal so saved can be put into the head of the rail, where it is most needed.

It is believed that rails can be designed for a longitudinal system with heads 3 in. wide, and, instead of weighing 110 lbs. to the yard, as in the last sheet of sections given by our Committee on Forms of Rails, they need not weigh over 70 lbs. to the yard. This saving of metal can be applied to reducing the cost of the whole system. The wear being confined to the upper rail, the amount of metal which goes into the scrap heap is the least possible.

Mr. Clarke showed the longitudinal bearing system of Mr. Hohenegger, of the Austrian State Railroads, which has been in use some 11 years with reported good results. It consists of a steel or iron inverted trough, 12 in. wide, to which the rail is attached by clips and bolts. Of this he said:

Obviously there are two defects in this design of track. The form of the longitudinal is such that the ballast is compressed by tamping and the pressure of passing trains to such an extent that it can only be loosened with a pick. This compression extends a foot below the longitudinal and prevents the quick drainage of water from between the rails. This could have been prevented by a better section of bearer, possibly of a T shape. The ballast could then be tamped against the vertical member from both sides, and, there being nothing to confine it there, the packing would not have taken place. Another mistake was to make the joints of the rails and of the longitudinal bearers coincide, instead of breaking joints. Mr. Hohenegger says nothing about the existence of low or battered joints, but they must have existed, and breaking joints with the bearers would have prevented them. A comparison of the cost of the crosstie systems now in use with that of a continuous-bearing system is as follows, prices of material being alike:

First.—Wooden crosstie system and 60 lb rails, $6,232.

Second.—Improved system with 80-lb. rails, treated ties, tieplates and two pairs interlocking bolts per rail, $ 8,739.

Third.—System further improved by use of 85-lb. rails and steel crossties, $14,025.

Fourth.—Hohenegger system of longitudinal bearings used on Austrian state railroads. Rails 64.38 lbs. per yard, $11,154.

From this it would seem that a first-class track, made with metallic longitudinal bearers, need not exceed the cost of a first-class track laid with metallac crossties.

There was considerable discussion of Mr. Clarke's paper, the sum of which was that the system shown does not meet a tithe of the acknowledged difficulties. It is not stiff enough; it would permit one side of the track to go down more than the other, and cause rocking, especially as the bearing in the roadbed is but 67 per cent. of that of the common crosstie track; it does not resist creeping of the whole track, etc.

A paper by Mr. William Barclay Parsons was next read, entitled "Mountain Railroad Construction." Of this we shall print a fuller abstract later. It is a description of some lumber railroads in Pennsylvania. Grades of 3.3 per cent. and 18d-egree curves are worked by "Shay" engines and ordinary moguls. There was no discussion of Mr. Parsons' paper.

The afternoon session closed with a discussion of Mr. J. A. Hall's paper on "Right of Way," which was recently printed in the *Railroad Gazette*.

Mr. Shinn recommended binding right-of-way plans in book form. His practice had been to have the plans of each county bound in one volume, with a plan of the alignment in that county on the first page. He suggested that a right-of-way agent should never have power to make agreements to have certain work done in lieu of money payment, for he is likely to allow a heavy charge to be added to the construction account to save a small charge to the right-of-way account. The centre line of right of way should be permanently monumented.

Mr. Nicholson told the story of a deed made in 1835 which contains a provision that the railroad shall run a "burden car" for the service of the seller of the land. Recently the courts have decided that the road must pay $15,000 for failure to run that "burden car" in the past, and run it in the future. Mr. Nicholson insists that the engineering department shall write the descriptive and conditional part of deeds, and the legal department shall supply the legal form.

Mr. Brush said that a company with which he is connected will not accept a deed until the engineering department and the legal department have both indorsed on it their approval of the description.

Thursday evening was given up to an address of welcome and short addresses on the history, geology and resources of the region by distinguished citizens.

FRIDAY.

Friday the party went down the river to Shellmount, by steamer, as the guests of the citizens of Chattanooga, returning by rail. The day was fair and not oppressively warm, the scenery beautiful and the whole excursion most enjoyable. In the evening Mr. Chanute delivered his annual address, of which an abstract follows. It was freely illustrated by stereopticon views.

THE PRESIDENT'S ADDRESS.

Mr. Chanute chose to select a few important examples and to present their most salient features.

Tunnels.—The New Croton Acqueduct was first mentioned—a rock tunnel 30 miles long, opened July 15, 1890, after 5 years of actual work. Its capacity is 318,000,000 gallons a day, and its cost to June 30, 1890 was $23,561,973.

The St. Clair tunnel was next mentioned. It is unnecessary to repeat here any of the facts about the dimensions and mode of construction of this tunnel, with which our readers have been made familiar. Mr. Chanute spoke especially of the admirable organization of the work which resembled a well arranged manufacturing establishment more than the temporary expedients of construction work. The Hudson River tunnel and the City & South London were also mentioned. A short description was given of the Jennings & Stannard system in use at the King's Cross Work, London, which consists in driving forward iron or steel sheet piles or needles. This system in good clay may be cheaper than the shield system. The valley of Mexico drainage tunnel was mentioned. The various methods used in these latter tunnels were spoken of as applicable chiefly to clay or firm silt, where the tunnels have generally been advanced from 10 to 13 feet a day, regardless of the diameter of the excavation.

For soft rock remarkable results were achieved with the machine invented by Colonels Beaumont and English, of the British Royal Engineers. This cut into chalk rock at the rate of a foot every 10 minutes, and once made 87 ft. in 24 hours. This was in the Dover-Calais tunnel, on which over two miles of work has actually been done. The machine consists of a cutter head of a single massive cross arm, equal to the diameter of the heading, driven by compressed air. This carries cast-iron cutters.

For very bad soil, and especially for tunnels that can go but little below the bottom of a river, still other means must be devised. The method of sinking pneumatic caissons in dredged channels was mentioned as a possible one, the ends being joined, while the material surrounding them is frozen by the Poetsch process.

Marine.—Especial mention was made of the great increase in lake tonnage both in number and capacity of vessels. Closely related to this is, of course, the improvement made and making in the various channels connecting the lakes, which will give a 20 ft. navigation from Duluth to Buffalo. As a means of further using the economy of water transportation several projects are being discussed. One of these is the "Hurontario" ship railroad, of which the readers of the *Railroad Gazette* already know through our abstract of Mr. Corthell's able paper before the Canadian Society of Civil Engineers. The Lake Erie and Ohio River ship canal was also described at some length as well as the Lake Michigan and Mississippi River canal.

Ship Railroads.—Under this head Mr. Chanute spoke briefly of the Chignecto ship railroad.

Railroads.—Mr. Chanute spoke of the increase of length of line in 1890, and of the progress made in the use of safety appliances, etc. He mentioned the Shay locomotive, described and illustrated in our issue of May 8, as one of the recent ingenious modes of working heavy grades.

Concerning increase in the capacity and wheel weights of rolling stock, he said that 10 years ago the standard freight car weighed 9 tons and carried 10. Now it weighs 12 and carries 20 tons; while cars of 30 tons capacity and weighing 15 tons are not uncommon. He suggested that we are in danger of going too far in this direction, and losing in wear of rail what is saved in hauling expenses. With 12,000 lbs. on drivers and 8,000 lbs. on freight car wheels we got pressures of 50,000 to 60,000 lbs. per square inch. With weights of 18,000 lbs. on drivers and 11,250 on car wheels we may be getting crushing weights on the rails.

Improvements in terminal facilities have not kept pace with other railroad economies. Switching yards should be more carefully arranged and cranes more used. Especially is there need of some mechanical method of handling freight between the receiving platforms and the cars. This problem is perhaps insoluble for it involves both carrying and sorting freight.

Among interesting special constructions were mentioned the Pike's Peak "Abt." railroad, with a maximum grade of 25 per cent.; the Mt. Pilatus road, maximum grade 48 per cent.; the Mt. San Salvatore cable road, maximum grade 60 per cent., and the proposed Jungfrau cable road with a maximum grade of 98 per cent.

Some time was devoted to the topics of common roads and metallurgy, and then Mr. Chanute took up

Bridges.—Under this head were mentioned the notable structures finished or building in 1890. They were the Red Rock cantilever bridge over the Colorado River with a span of 660 ft., S. M. Rowe, Chief Engineer, built by the Phœnix Bridge Co.; the Terminal Elevated Railway in St. Louis, by the same company; the Wheeling Bridge & Terminal Co.'s bridge, Job Abbott, Chief Engineer, Edge Moor works, builders; the James River bridge of the Richmond, Fredericksburg & Potomac, Edge Moor works, builders; the Ohio Connecting Railway bridge, M. J. Becker, Chief Engineer, Keystone Bridge Co., builders; the Newport & Cincinnati bridge, King Iron Bridge & Manufacturing Co., builders, main design by Mr. G. Bouscaren. Several notable structures building in other countries were also mentioned; but all of them, as well as those cited above, have been more or less completely described in the *Railroad Gazette*, and we will not repeat the data here.

Buildings.—Examples of some of the most remarkable buildings now erecting or completed in Chicago were shown and described. These included the Masonic Temple, 20 stories high, 113 ft. × 170 ft. in plan, and 274 ft. above the sidewalk. A remarkable development of the new mode of building is the machinery for hoisting the material. In the new hotel, the "Chicago," 170 ft. above the sidewalk, all the posts, girders, etc., were hoisted by a self-propelling rotary crane, which also hoisted itself from floor to floor. It runs on a moveable track and commands all parts of the structure. It is worked by one man, who fires also. In this building the steel frame was at one time carried six stories above all other construction. The steel work was furnished and erected by the Keystown works from Mr. Strobel's designs. The foundations of these remarkable Chicago buildings, on platforms of concrete and I-beams were described. They carry 1½ tons per square ft. on the soft clay.

Electrical Engineering.—This topic was treated at some length, figures being given of the increase in electric railroads, lighting plants, etc., etc. Mr. Chanute does not think that electric motors are likely to replace steam on the great railroads until the art is developed beyond anything now in sight.

The address closed with a glance at the affairs of the Society and the condition of the profession. Mr. Chanute pointed out the importance of monographs by the members on the work done by them, fuller and more carefully written and more thoroughly discussed than is common yet. He also reminded the members of their debt of hospitality to the Englishmen and Frenchmen who entertained them in 1889, and of the opportunity that will be given to them to return that hospitality in the year of the Columbian World's Fair, when an engineering congress will probably be held.

SATURDAY.

Saturday morning a business meeting was held. The report of the Committee appointed to recommend a way

of appointing the Nominating Committee was received. This and the results have been given in the report of Thursday's doings.

None of the standing committees made anything other than progress reports.

The report of the Committee on the South Fork Dam was read. It is well known that this report has been in the possession of the Society, under seal, for more than a year. The decisions of the courts have finally removed the reason for any longer keeping the report sealed. These are to the effect that the club owning the dam is not responsible for its failure. The same conclusion had been reached by the Committee.

The Committee consisted of Messrs. Francis, Fteley, Worthen and Becker, and its report is a very thorough, exhaustive and able document. It embodies a report from Mr. John G. Parke, Jr., which for clear and graphic statement would be hard to beat.

The Committee estimates the loss of life at about 2,500, probably less, and the loss of property at between $3,000,000 and $4,000,000. If the original designs of Morris had been carried out and maintained the dam would probably not have failed in spite of the enormous volume of water coming into the reservoir; but the club could not be bound to anticipate and provide for such an unprecented rainfall.

Saturday afternoon the above-mentioned report was discussed.

Mr. John Thompson presented a very fine paper on water meters, and Mr. J. M. Goodwin spoke briefly on the Lake Erie & Ohio River Ship Canal.

In the evening the "banquet" took place. This time-honored institution was for various reasons fairly successful. A considerable number of guests from Chattanooga added much to the interest of the occasion.

Mr. Shinn acted as toastmaster, and the speakers were President Chanute, Gen. Warner of Chattanooga), Mr. H. G. Prout, Col. Merrill (U. S. A.), Judge Key (Postmaster General in the Hayes Cabinet), Prof. C. B. Brush, Mr. G. B. Nicholson, Mr. William Metcalf and Capt. R. W. Hunt.

Train Accidents in the United States in April.

COLLISIONS.

REAR.

1st, on Kentucky Central, near Cynthiana, Ky., a freight train broke in two, and the rear section ran into the forward one, damaging the caboose and several cars. Conductor jumped and was killed.

2d, on East Tennessee, Virginia & Georgia, near Holton, Ga., a freight train broke apart in two places, and the three parts afterward collided, wrecking a number of cars and killing a brakeman.

4th, on Lehigh Valley, at Port Bowkley Station, Pa., a passenger train running about 40 miles an hour crashed into the rear end of a freight train which was projecting over the main track from a siding. The cab of the passenger engine was torn off, the baggage car wrecked and the rear sleeper derailed. Engineer and baggage master slightly injured.

5th, on Cincinnati, New Orleans & Texas Pacific, near Ludlow, Ky., a freight train became uncontrollable on a long descending grade and ran into a yard engine at the foot, wrecking both engines and 14 cars. A brakeman was killed and the engineer and fireman were injured

7th, on Pennsylvania, near Mineral Point, Pa., a freight train with a pusher engine which had stopped unexpectedly was run into by a following freight train drawn by two locomotives, badly damaging 3 engines and 6 cars and injuring 7 trainmen.

10th, on New York & New England, in Providence, R. I., a passenger train ran over a misplaced switch and collided with some freight cars standing on a siding, damaging a number of them and disabling the engine. Engineer and fireman injured.

13th, on Delaware & Hudson, near Cobleskill, N. Y., a fast freight train ran into the rear of a construction train, wrecking the colliding engine and several cars of the other train, including one containing 5 employés, 2 of whom were killed and 3 injured.

13th, on Union Pacific, at Starbuck, Wash., a runaway engine dashed into a freight train, causing the explosion of the engine's boiler. Two freight cars were fired by scattered coals and burned up.

15th, on Great Northern, near New London, Minn., a special train carrying officials of the road ran into the rear of a freight train damaging the locomotive and injuring 3 trainmen.

24th, on Pennsylvania, at Rahway, N. J., a westbound freight train ran into the rear of a preceding freight which had come to a stop. Engine, caboose and 1 car badly wrecked and 6 freight cars damaged.

24th, on Pittsburgh & Lake Erie, at Rock Point, Pa., a freight train ran into a construction train standing on the main track, killing two laborers and injuring several others.

27th, 1:30 a. m., on Louisville & Nashville, in Cincinnati, O., an excursion train ran into some freight cars that had been left standing on the main track, injuring 6 passengers. The freight failed to properly signal the passenger train.

28th, on Baltimore & Ohio, at Warings, Md., a fast passenger train, westbound, ran into a freight train standing on the main track at the station, making a very bad wreck. The 4 forward cars of the passenger train were derailed and ditched, and a fire started which burned up 3 of them; 4 trainmen killed and 2 injured.

29th, 8:30 p. m., on Atlantic & Danville, near Danville, Va., a freight train ran into the rear of a preceding freight, doing slight damage. Engineer, fireman and brakeman injured. It is said that the foremost train had almost stopped, but had not sent back a signal. The other train "would have gone half-way through the one in front of it" had not 6 cars been quipped with air brakes.

And 11 others on 9 roads, involving 2 passenger and 13 other trains.

BUTTING.

2d, on New York, Lake Erie & Western, near Hinsdale, N. Y., butting collision between two freight trains, badly damaging both engines, killing 3 trainmen and injuring another.

7th, 1 a. m., on Central of Georgia, near Oconee, Ga., butting collision between two passenger trains, due to a misplaced switch, disabling the locomotives. Two trainmen injured.

10th, on Chicago, Rock Island & Pacific, near Washington, Ia., butting collision between a passenger train and a freight train, due to a misunderstanding of orders, badly damaging the forward portion of both trains, injuring 3 trainmen and 3 passengers.

13th, on Asheville & Spartanburg, near Tryon City, N C., butting collision between a freight train and a construction train, due to the former running against orders, wrecking an engine and several cars. Two trainmen and 3 other employés were killed and 10 employés injured.

15th, on St. Louis, Alton & Springfield, near Alton, Ill., butting collision between a mixed train and a freight train, wrecking both locomotives and several cars, and injuring both engineers.

17th, on Ohio & Mississippi, near Loogootee, Ind., butting collision between two passenger trains, one of which was about to enter a siding, badly damaging the engine and several cars in each train. A tramp stealing a ride was killed and 2 trainmen and several passengers were injured.

17th, on Illinois Central, near McConnell, Tenn., butting collision on a curve between a construction train and a freight train, doing considerable damage, killing a tramp and injuring 2 others.

18th, on Lake Shore & Michigan Southern, at Kipton, O., butting collision between eastbound fast mail tra'n No. 14 and westbound accommodation passenger train No. 21, killing 2 engineers, 6 postal clerks and 1 fireman and injuring 1 fireman, 2 passengers and a man standing on the station platform. Train 21 was running slowly, but the other was running at about 50 miles an hour, and the wreck was a very bad one. Train 21 should have been on the sidetrack 300 ft. west of Kipton station by 4:52 p. m., the time at which 14 was due to leave this station; but according to the best testimony the collision occurred at 4:53, thus throwing the blame upon conductor and engineman of No. 21. Train 14 had by special rule the absolute right of track over westbound passenger trains and therefore was not bound to slacken speed at the meeting point. The day was clear and the curve on which the collision occurred was of about 11,460 ft. radius, so that, notwithstanding the presence of freight cars on a sidetrack, the runner of No. 14 could have seen the track for about 700 ft. ahead. This collision was reported in the *Railroad Gazette* of April 24.

23d, on Baltimore & Ohio, near Burton, O., collision between a passenger train and a light engine, damaging both locomotives and a baggage car. Two trainmen and 4 passengers injured.

28th, night, on Missouri, Kansas & Texas, near Caney, I. T., butting collision between a freight train and a work train, wrecking both engines. Two passengers injured.

29th, on Chicago & Alton, at Upper Alton, Ill., butting collision between two freight trains on a sharp curve, wrecking both engines and 6 cars and badly injuring a fireman.

And 8 others on 7 roads, involving 6 passenger and 10 other trains.

CROSSING AND MISCELLANEOUS.

4th, on Denver & Rio Grande, at Malta, Col., a freight train struck the side of another freight train, badly damaging 2 locomotives, killing 1 trainman and injuring another.

9th, on Housatonic, at Bridgeport, Conn., a switching freight train moving backward ran over a misplaced switch and struck some empty passenger cars standing on a siding, pushing several of them off the end of track into a street, killing a pedestrian. Three of the passenger cars were thrown off their trucks and a tank house was demolished.

21st, at Waycross, Ga., a Savannah, Florida & Western freight train ran into a Brunswick & Western freight at the crossing, doing some damage and injuring a trainman.

21st, on Philadelphia & Reading, at Shoemakersville, Pa., a heavy freight train, approaching on a curve, ran into a switching coal train, wrecking the engine and several cars and blocking both main tracks. The flagman of the coal train did not go back far enough.

24th, on Valley road, at Akron, O., a passenger train was backed over a misplaced switch into a construction train standing on a siding, damaging the rear car.

29th, midnight, at Union Station, Indianapolis, Ind., a runaway engine which had started from the shops east of the city collided with a Lake Erie & Western switching engine, wrecking both engines and 2 baggage cars. One engineer injured.

And sixteen others on 14 roads, involving 5 passenger and 25 other trains.

DERAILMENTS.

DEFECTS OF ROAD.

4th, on St. Louis, Iron Mountain & Southern, at Elmo, Ark., the forward portion of a freight train went through a trestle, injuring 2 trainmen.

14th, on Missouri Pacific, near Falls City, Neb., a passenger train broke through a culvert, and the whole train except the engine and the rear sleeper were overturned in the ditch. Express messenger and several passengers injured.

14th, on Columbus & Cincinnati Midland, near Mount Sterling, O., a freight train broke through a trestle. The locomotive and 1 car got across safely, but 15 cars went down about 15 ft. and were wrecked. A stockman in charge of horses and 3 tramps stealing a ride were injured.

15th, on Gulf, Colorado & Santa Fé, near Gainesville, Tex., the engine and several cars of a freight train went through a bridge into the Leon River, the foundations of which had been undermined in a freshet, killing 3 trainmen.

22d, on Louisville, New Orleans & Texas Pacific, at Gayden, La., a freight train was derailed at a defective switch and wrecked, killing 1 trainman and injuring another.

26th, at 3:20 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, near Indianapolis, Ind., the rear car of a passenger train running 50 miles an hour was thrown from the track by a broken rail and overturned in the ditch, injuring 6 passengers. There was a flaw in the web and flange of the defective rail, but it was of such a nature as to be undiscoverable while the rail was in position. The rail had been in use several years but was not much worn.

16th, on Queen & Crescent, near Brandon, Miss., the rear car of a passenger train was thrown from the track by the spreading of the rails and overturned. Several passengers slightly injured.

16th, morning, on Maryland Central, near Fallston, Md., a freight train consisting of 12 cars and 3 engines, two of which were pushing, broke through a bridge, all but the forward engine falling 50 ft. into a ravine below. The wreck was fired by burning coals from the engines and, together with the trestle, burned up. Four trainmen killed and 1 injured. Testimony before a coroner's jury was to the effect that the trestle was unsound. The directors of the road were indicted for manslaughter.

20th, on Philadelphia & Reading, at the crossing of the Lehigh Valley near Bound Brook, N. J., 2 rear cars of a northbound passenger train were run upon the sidetrack at a derailing switch. The cars were torn apart from the rest of the train, but little damage was done.

20th, on Utah Central, near Park City, Utah, a passenger train running slowly was derailed by spreading of the rails where the roadbed was soft. A passenger car was overturned and 3 passengers injured.

And 11 others on 9 roads, involving 3 passenger and 8 other trains.

DEFECTS OF EQUIPMENT.

14th, on Great Northern, near Rothsay, Minn., 10 cars of a freight train were derailed and wrecked by a broken journal; they took fire and were burned up. A tramp was injured.

18th, on New York, New Haven & Hartford, in Fair Haven, Conn., the engine of a passenger train was derailed on a curve by a broken driving-wheel flange, and overturned in the ditch. The baggage car was also derailed. Engineer badly hurt.

22d, on Pennsylvania, at Kinzers, Pa., car of a westbound freight train was derailed by a broken axle and thrown upon an adjoining track, derailing an eastbound freight and wrecking about 20 cars altogether. A brakeman was killed.

24th, on Lake Shore & Michigan Southern, near Fairview, Pa., a car of a freight train was derailed by the dropping of a brake-beam and thrown over on the opposite main track in front of an approaching passenger train, badly wrecking the engine and several freight cars, killing a brakeman and injuring an engineer.

27th, on St. Louis, Iron Mountain & Southern, at Harviet, Mo., coal train derailed by a broken axle, throwing 15 cars into the ditch and killing a tramp.

28th, on Lehigh Valley, near Black Creek Junction, Pa., a freight train of 70 loaded coal cars was derailed by the breaking of an axle near the front of the train, making a very bad wreck.

And 16 others on 10 roads, involving 1 passenger and 15 other trains.

NEGLIGENCE IN OPERATING.

8th, on Pittsburgh & Western, near Mineral Point, Pa., engine and 7 cars of a freight train were derailed by a misplaced switch and went into the ditch. Fireman injured.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, near Sandusky, O., the engine, baggage and express cars of a passenger train were derailed by a misplaced switch. The engine was overturned, fatally injuring the engineer and badly bruising the fireman.

10th, on Louisville & Nashville, near London, Ky., the baggage car and 3 coaches of a passenger train were derailed and overturned at a point where track repairs were in progress, injuring an express messenger and 3 passengers, the former fatally.

20th, about 6 p. m., on Staten Island Rapid Transit, near Port Richmond, S. I., a passenger train ran into an open draw, the engine going down into a creek and the forward end of the first (combination) car landing on top of it. No one was seriously injured, the men on the engine jumping off and the passengers in the forward car being in the rear end of it. The car was pulled back upon the track. The engineer ran into the draw in the face of a danger signal.

21st, on Lehigh Valley, at Rockdale, Pa., a horse in charge, of a keeper in one of the cars of a freight train, got out of the car in some way and fell under the cars of a freight train moving in the opposite direction on the adjoining main track, derailing several cars. A brakeman was killed. The man in charge of the horse went to sleep with the door unfastened.

23d, on Houston & Texas Central, near Cypress, Tex., a freight train was derailed at a point where track repairs were in progress, injuring the fireman.

And 10 others on 8 roads, involving 2 passenger and 8 other trains.

UNFORESEEN OBSTRUCTIONS.

3d, on Charlotte, Columbia & Augusta, near Newton, N. C., a construction train was thrown off the track by a rail which had been maliciously fastened across it by a man who had the day previous been put off a passenger train for nonpayment of fare, his designs having been on a passenger train then nearly due. The engine and several cars were damaged and a number of employés were injured.

6th, on Boston & Albany, near Westfield, Mass., a passenger train running about 40 miles an hour was derailed by some ties which had been maliciously placed across the track at a bridge, the locomotive, 2 mail and an express car leaving the rails and going down a 20-ft. bank. Engineer, brakeman and express messenger injured. This accident was reported in the *Railroad Gazette* of April 17.

9th, on St. Louis, Iron Mountain & Southern, near Blackfish, Ark., a freight train ran over a cow, and the engine and 8 cars were derailed, injuring 2 trainmen.

13th, 1:15 a. m., on Pittsburgh & Western, near Vanport, Pa., a passenger train ran into a landslide, the engine being derailed and the express, baggage and mail cars going over an embankment. Engineer, fireman and an express messenger injured.

15th, on Suffolk Lumber Co.'s road, near Suffolk, Va., a train of flat cars which was being pushed by a locomotive ran over a cow on a curve, and 20 cars were derailed and wrecked, killing an employé and injuring several others.

22d, on Alabama Great Southern, near Springville, Ala., the engine and 4 cars of a freight train were derailed and overturned at a point where rail fastenings had been maliciously removed. The engineer and fireman were scalded to death and 2 other trainmen were injured.

27th, on Southern Pacific, at Strauss, Ariz., the engine and 4 cars of a freight train were derailed by sand which had drifted upon the track. The locomotive was overturned, killing a brakeman and injuring the engineer and fireman.

28th, on Toledo, St. Louis & Kansas City, at Greentown, Ind , a stock train was derailed by running over a cow, wrecking engine and 8 cars. Engineer killed and fireman injured.

And 5 others on 5 roads, involving 2 passenger and 3 other trains.

UNEXPLAINED.

1st, on Montgomery & Eufaula road, near Union Springs, Ala., 2 cars and the caboose of a freight train were derailed and damaged, badly injuring the conductor.

1st, on Union Pacific, near Catskill, Col., the caboose

and several cars of a freight train were derailed at a culvert and badly damaged, seriously injuring a trainman.

2d, on Central of New Jersey, at Springtown, N. J., 18 cars of a freight train were derailed, injuring a brakeman.

9th, on Wisconsin Central, near Vernon, Wis., the engine of a freight train was derailed and tipped off a bridge. One trainman killed, 1 fatally and 3 seriously injured.

15th, on Middlesboro Belt road, at Middlesboro, Ky., a car of a freight train was derailed and wrecked, killing 1 person and injuring 2 others.

16th, on Illinois Central, near Yazoo City, Miss., a freight train was derailed at and broke through a trestle. The caboose and several cars went into the creek, injuring the conductor and 3 passengers.

And 30 others on 25 roads, involving 5 passenger and 25 other trains.

OTHER ACCIDENTS.

9th, on Northern Pacific, near Buckley, Wash., engine of a freight train exploded its boiler. The engineer was badly scalded and the fireman was injured by jumping.

29th, on Rome, Watertown & Ogdensburg, at Oswego, N. Y., engine of a switching freight train wrecked by the explosion of its boiler. Engineer killed, fireman injured.

30th, on Cincinnati, Hamilton & Dayton, at Dayton, O., engine of freight train wrecked by the explosion of its boiler. Fireman killed and engineer and brakeman injured.

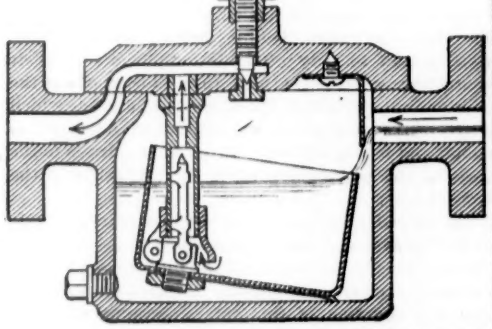
And 3 others on 3 roads, involving 1 passenger and 2 other trains.

A summary will be found in another column.

A German Steam Trap.

J. Losenhausen, of Duesseldorf, Prussia, is the maker of the trap for drawing off water of condensation shown by the accompanying cut.

It consists of a cast-iron reservoir containing a copper float, attached, by means of a swivel joint, to the exit pipe suspended from the reservoir cover. The water entering the reservoir with the steam falls to the bottom, being directed by a vertical guard attached to the



cover. As soon as the water attains the height of the top of the float it enters and sinks the same; this action opens the plug valve in the exit pipe, and allows the water to be blown out.

The cover of the trap may be removed and the entire reservoir and inclosed pipes be cleaned without taking apart any of the valves and connections. By means of a simple screw plug in the cover, the steam may be admitted to the waste pipe, thoroughly cleansing the same.

The lever action upon the valve and float is a very effective construction, and gives complete independence of action regardless of ordinary variations in steam pressure, and large capacity with small external dimensions is attained. The swinging of the float upon two trunnions gives an exact and almost frictionless movement. The use of the open float obviates all trouble from leakage in that part.

Abstract of Patents on the Compound Locomotive

IV.

The first part of this abstract was published in the *Railroad Gazette* of Feb. 13. For the tabulated list of patents the reader is referred to that issue.

Pat. No. 428,892. (American Patent.) Inventor, Henry F. Colvin, Dated May 27, 1890. Claim: 1. A steam engine having high and low pressure cylinders, a live steam passage leading direct to the high-pressure cylinder, and a passage with reducing valve leading from the live steam passage to the low-pressure cylinder and a controlling valve having an exhaust passage leading from the high pressure cylinder to its chamber, and an exhaust passage leading from said cylinder, the said live-steam passage to the low-pressure cylinder leading into said controlling valve chamber, said parts being combined.

2. A steam engine having a high-pressure cylinder and a low-pressure cylinder, a supply passage having the reducing valve, the exhaust passage leading from the high-pressure cylinder, the passage leading to the low pressure cylinder, the passage leading to the atmosphere, the reciprocating valve, with heads, adapted to alternately open and close the communication of the passage with the passages.

XXXVI.—Pat. 443,164. (American Patent). Inventor, Francis W. Dean. Dated July 29, 1890. Claim: 1. In combination with the high and low pressure cylinders of a compound engine, their steam chests and steam passages, a communicating passage between said cylinders, comprising a forked pipe having a single opening communicating with the exhaust of the high-pressure cylinder, and two branches therefrom having an aggregate area of cross-section and exterior surface greater than the initial or single portion of said pipe.

2. In combination with the high and low pressure cylinders of a compound engine, their steam chests and steam passages, a communicating pipe connecting said cylinders, comprising a single pipe for a short distance at one end and two parallel branches forking therefrom and having an aggregate area in cross-section much greater than the area of the single initial portion thereof, said branches having a portion of their length expanded to a much larger area of cross-section to form receivers.

3. In combination with the high and low pressure cylinders of a compound engine, their steam chests and steam passages, a pipe communicating with the exhaust-passage of the high-pressure cylinder at one end and having its other end curved and terminating in an inclined plane and provided with a collar below said inclined end, a second pipe inclosing said curved and inclined end and secured to said collar and provided with a side opening, a bonnet or cover for closing said opening, having an annular valve seat upon its inner face, a clapper valve pivoted within said second pipe in position to be seated upon the valve seat on the inner face of said cover, or upon the oblique upper end of the first pipe, the converting valve, its casing, the piston, the pipe, for supplying live steam to the high-pressure steam chest, the pipes connecting the interior of the pipe with the under side of said valve, the pipe connecting the interior of the chamber of the converting valve casing with the interior of the pipe, and the pipe connecting the interior of the pipe with the interior of the chamber above the piston.

4. In a compound engine the combination with the high and low pressure cylinders and a steam pipe connecting said cylinders of an intercepting valve, comprising two seats arranged at an angle to each other and each inclined from a perpendicular plane in opposite directions, with their lower sides nearest to each other and a clapper valve mounted upon a pivotal axis between said seats, and constructed and arranged to be alternately moved in opposite directions by the pressure of steam, and to rest upon and close the passage through each of said seats, according as the flow of steam is through one or the other of said seats.

5. In combination with the high and low-pressure cylinders of a compound engine, the pipe, having its upper end curved and cut oblique to its axis to form a valve seat, the pipe, constructed and arranged to inclose the curved oblique upper end of said pipe, and provided with a lateral opening closed by a removable bonnet, an annular seat on the inner face of said bonnet inclined from a perpendicular plane in a direction the opposite of the plane of inclination of the oblique end of the pipe, a clapper valve pivoted between said two seats in a position to co operate with each other of said seats and to be held thereto by the pressure of steam, assisted by the force of gravity, and the pipe for admitting live steam through said bonnet and closing said valve on the end of said pipe.

XXXIV.—Pat. No. 428,892. (American Patent.) Inventor, Henry F. Colvin. Dated May 27, 1890. Claim: A steam engine having high and low pressure cylinders, a live steam passage leading direct to the high-pressure cylinder, and a passage with reducing valve leading from the live steam passage to the low-pressure cylinder, and a controlling valve having an exhaust passage leading from the high pressure cylinder to its chamber, and an exhaust passage leading from said cylinder, the said live steam passage to the low-pressure cylinder leading into said controlling valve chamber, said parts being combined.

Pat. No 439,969. (American Patent.) Inventors, Julian H. Pitkin and Julius S. Lane. Dated Dec. 12, 1889. Claim: 1. In a compound engine, and in combination with the usual communicating cylinders and their valves, a throttle controlling the steam delivery to both cylinders, a throttle controlling the delivery of steam to the large cylinder only, and connecting devices between said throttles, substantially as shown, for operating them independently or jointly at will.

2. In compound engine, the main steam pipe, its throttle, and the throttle operating lever controlling the steam delivery to the high-pressure cylinder, in combination with the branch pipe for delivering high-pressure steam to the low-pressure cylinder, the throttle of the branch pipe, its operating lever, and devices whereby said levers may be connected together or disconnected at will.

3. In compound engine, the main throttle and lever controlling the delivery of steam to both the high and low pressure cylinders, and a locking device to hold the lever, as usual, in combination with the secondary throttle and lever for admitting high-pressure steam directly to the low-pressure cylinder, and the toothed bar and catch connecting said levers.

4. In a compound engine, the steam pipe leading from the boiler to the high pressure cylinders, and the main throttle valve and its lever controlling said pipe, in combination with the branch pipe leading to the low-pressure cylinders, the throttle in the branch pipe, the piston, and the cylinder to operate the second throttle, the steam pipe leading from the boiler to cylinder, the valve, the operating rod and lever, and the catch or locking device connecting said lever with the main throttle lever.

Pat. No. 431,869. (American Patent.) Inventor, Samuel M. Vauclain. Compound engine. Dated Feb. 8, 1890. Claim: 1. The combination, in a compound engine, of the high and low pressure cylinders, a passage forming a communication between the front and the rear of the high-pressure cylinder, with a valve controlling the flow of steam through said passage from one end of the cylinder to the other, substantially as described.

2. The combination in a high and low pressure cylinder, a valve or valves therefor, a passage communicating with each end of the high-pressure cylinder with two valves, one at each end of the passage, said valve being under the control of the engineer, and adapted to allow or cut off the flow of steam through the passage from one end of the cylinder to the other, substantially as described.

Pat. No. 433,959. (American Patent.) Inventor, Richard H. Lapage. Dated Feb. 6, 1889. Claim: 1. In compound locomotive, the combination, with a single high-pressure cylinder and two connected low-pressure cylinders, to both of which steam is admitted simultaneously, and from both of which it is exhausted simultaneously.

2. In compound locomotive, the combination with single high-pressure cylinder, of two connected low-pressure cylinders having a common steam chest, and a connecting pipe between said high-pressure cylinder and said steam chest, substantially as herein described.

3. In compound locomotive, combination single high-pressure cylinder with two low-pressure cylinders situated one above the other and both driving onto one crank pin.

Pat. No 433,164. (American Patent.) Inventor, F. W. Dean. Dated May 29, 1890. Claim: 1. In combination with the high and low pressure cylinders of a compound engine, their steam chests, and steam passages, a communicating passage between said cylinders, comprising a forked pipe having a single opening communicating with the exhaust of the high-pressure cylinder, and two branches therefrom having an aggregate area of cross-section and exterior service greater than the initial of or single portion of said pipe, as set forth.

2. In combination with the high and low pressure cylinders of a compound engine, their steam chests and steam passages, a communicating pipe connecting said cylinders comprising a single pipe for a short distance at one end and two parallel branches forking therefrom, and having an aggregate area much greater than the area of the single initial portion thereof, said branches having a portion of their length expanded to a much larger area of cross-section to form receivers.

4. In combination with the high and low pressure cylinders of an intercepting valve, comprising two seats arranged at an angle to each other and each inclined from a perpendicular plane in opposite directions, with their lower sides nearest to each other, and a clapper valve mounted upon a pivotal axle between said seats and constructed and arranged to be alternately moved in opposite directions by the pressure of steam, and to rest upon and close the passage through each of said seats, according as the flow of steam is through one or the other of said seats.

Pat. No. 438,969. (American Patent.) Inventor, Ransom C. Wright. Dated July 31, 1889.

3. In compound locomotive, the combination with the high-pressure and low-pressure cylinders on each side, crosshead on each piston and two levers to connecting piston of low-pressure cylinder with piston of low-pressure cylinder on other side, means for connecting pistons with shaft of locomotive and valve for each cylinder.

5. Piston in high-pressure cylinder being connected and traveling in opposite direction from piston in low-pressure cylinder on opposite side, and means for admitting steam independently to and exhausting from said cylinders.

6. A lever connected with each low-pressure cylinder valve, and two rock shafts for connecting the levers of the low-pressure valves with the high-pressure valves on the opposite sides, and moving same in opposite directions at the same time.

11. High and low pressure cylinders and a receiver, compound valve for each pair of cylinders having two ports and partition between them, one port adapted to communicate with the high-pressure cylinder and exhaust pipe, and the other port with said cylinder and the receiver and means for moving valve.

Pat. No 4,296. (English Patent.) Inventor, F. J. Burrell. Compound Locomotive Engines. Dated March 19, 1890. Steam is expanded in succession in four double-acting cylinders, viz., a high-pressure cylinder, a first intermediate-pressure cylinder, a second intermediate cylinder and low-pressure cylinder. The cylinders are arranged between the frames below the smoke box, and their pistons are fixed respectively on piston rods. The cranks are arranged at right angles to each other, and inside the framing. The slide valves are actuated by a common valve rod, and the slide valves are also actuated by a common valve rod, each valve rod being operated by a separate set of Joy's valve gear. Steam is supplied by the steam pipe to the valve chest of the cylinder, whence, after acting in one direction upon the piston, it exhausts by a connecting pipe into the valve chest of the cylinder, where it is so distributed as to act upon the piston in the other direction. The exhaust steam passes from the cylinder through an exhaust passage into the valve chest, whence it is distributed by the valve to act upon the piston, after which it exhausts through a connecting pipe into the valve chest. The exhaust steam from the cylinder admitted by the valve into the cylinder acts upon the piston, and finally the steam escapes from the cylinder through an exhaust passage and the usual exhaust pipe.

Pat. No. 17,417. (English Patent.) Inventor, J. Klein. Compound Steam Engine. Dated Oct. 31, 1890. This invention relates to an improved expansion distributing slide valve motion, with steam-chest filled with steam from the boiler, for compound engines, which is characterized by the arrangement of a distributing slide valve common to two cylinders and arranged in the slidebox of the large cylinder, whereby the inlet and outlet passages of the small cylinder become very long and form thus with the chambers and steam chests, while the low-pressure cylinder has short passages, so that always one chest at the forward stroke of the piston in the low-pressure cylinder is filled with steam from the boiler and then shut off, in order to make at the subsequent backward stroke of the piston, its steam filling, and that of the corresponding side of the high-pressure cylinder to expand directly by the agency of the slide into the opened low-pressure cylinder and to perform work.

THE SCRAP HEAP.

Notes.

The machine shops and blacksmith shop, paint shop and other buildings of the New York Central at West Albany were destroyed by fire on May 21. It is estimated that the loss will reach $150,000.

The Buffalo Association of Railroad Superintendents has re-elected the following officers: President, F. A. Seabert, D., L. & W.; Vice-President, C. A. Brunn, N. Y., L. E. & W.; Secretary and Treasurer, W. W. Halsey.

Sunday observance is making great strides in France. The Minister of Public Works has ordered freight stations (now kept open until noon on Sundays and holidays) to be closed hereafter at 10 a. m., except in the case of certain specified merchandise.

The New York, Ontario & Western is now equipping all its engines with new eight-inch Westinghouse air pumps in place of the old six-inch pumps that are being removed. All passenger trains are being equipped with the Westinghouse train air signal. The engines are also being equipped with the Boyer speed-recorder indicators.

A dispatch from Des Moines, Ia., states that John C. Newton, Vice-President of the Des Moines & Kansas City, has been indicted by the grand jury for trying to defraud the government by sending fictitious mail matter for the purpose of increasing the gross amount of mail carried over his road during the month in which weights are taken to get at the basis of rates to be paid the road for transportation during the next four-year term. It will be remembered that a similar report was printed last week respecting a road in Colorado. M. F. Oxford, of Kanesville, Mo., was also indicted as an accessory.

General Manager Carroll, of the Queen & Crescent System, has, after protracted negotiations, come to a settlement with the enginemen and firemen of the system, who asked for better pay, and appointed Messrs. Arthur and Sargent their spokesmen. The terms of the settlement are not given out. The most noticeable feature of the case, as shown in Mr. Carroll's published reply to the original communication of the men, is the sweeping nature of the demands made. Such little matters as changing division termini and paying for train work by the hour instead of by the trip are apparently held by the men to be minor points which can be altered by a stroke of the pen.

The Staten Island Rapid Transit road has had its ferryboat Westfield remodeled in its interior arrangements. The hull also has been thoroughly overhauled and new keelsons and braces put in. This part of the work was done by the Allisons, of Jersey City. The engine was removed by the Messrs. Theall, of the New York Iron Works, and several important changes made. Two new steel boilers having 850 horse power have been substituted for the old boilers.

The Thomas Murray Co., of New York City, has just completed the construction of the Grand View Beach electric railroad to Lake Ontario, near Rochester. The cars are now running very successfully from Charlotte to Manitou Beach, a distance of eight miles. The Thomas Murray Co. was under contract to complete the construction of this road, embracing the trackwork, grading, cribbing, bridging, overhead construction, cars, motors, generators, power-house and in fact everything in connection with the complete construction of an electrical road, all the work to be completed May 20. The firm had only 60 days to build this road.

The Intercontinental Railroad.

The Intercontinental Railroad Commission Bureau at Washington has been informed of the arrival at Guayaquil, Ecuador, on April 27, of the two parties of civil engineers sent out by the Commission to determine the feasibility of a railroad between North and South America. The parties left Guayaquil on April 27 for Quito, which place will be the headquarters of the surveying parties for the next few months. Later on the two parties will separate, one working north through Colombia to meet the engineers detailed from the Army and now surveying in Central America, and the other going south into the interior of Peru and thence to Brazil. The Commission is also informed of the arrival on May 10 of the Army engineeers at San Jose, Guatemala, and of the appointment by the Guatemalan Government of two civil engineers who will co-operate with the army men in their survey of the Central American States.

A "Personally Conducted" Excursion.

The annual convention of the Order of Railway Conductors concluded its business at St. Louis, May 29, and adjourned to meet in Toledo next year. On the 21st a special train of 10 Pullman cars and 1 baggage car took a full load of conductors and their wives as the guests of the Missouri Pacific on an excursion to Kansas City, and thence to Texas and New Orleans.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Annual Convention of the American Society of Civil Engineers has come and gone with the usual results,—a thoroughly good time, and nothing "epoch-making" in either papers, reports or discussions. The papers were, however, of a pretty high average quality, some of them having been unusually good, and some of very moderate merit. The standing committees made no reports. The Committee on Standard Rail Sections could not get a quorum. We are left still in the dark, therefore, as to the exact significance of the sets of sections, designed by the various members, which we published Feb. 20. This may properly be said, however,—the Committee has had no meeting since those designs were sent in, it has taken no action on them, and the publication was premature. What the further action of the committee will be is pure speculation, and we shall not speculate on it. This we may say, that there is still plenty of time for our readers to work on the individual members of the Committee and to discuss the sections and the ground question of attempting to establish a standard set of sections. Those who wish to influence the report had better pitch in. They may be able to accomplish more now than after the report is made.

The report of the Committee on the Causes of the Failure of the South Fork Dam, which has been so long withheld for reasons of public policy, was presented in manuscript and read. It is a document which must be read with care and studied if one is to get at its real value, and we have only heard it read in the meeting; but it is certainly an able paper, and worthy of the great occasion which brought it out and of the distinguished men who wrote it.

But, after all, the work is only the frame on which to hang the real convention, and the real convention was at least up to the average. It brought together not only a fair representation of those who habitually go to conventions, but a good many from the South and Southwest who are not often seen at them. The place was well chosen for this purpose, and also for social, historical and industrial reasons. The only drawback to the pleasure of those who attended was that the handsome, new hotel, magnificently placed, was very badly kept. The cooking and table service especially were thoroughly unsatisfactory. All the administrative details of the convention itself were carried out with an absence of fuss, and with a quiet efficiency, which were not unexpected, but very agreeable.

The decision of the Commissioners of the Western Traffic Association that "through rates cannot properly be made otherwise than by the publication of a through tariff, naming rates from point of shipment to destination, or by the addition of regular published rates to and from some intermediate basing point," shows a determination that so far as the lines in their association are concerned they mean that the law must be observed. It seems that it has been customary for the lines to add the published rates of their own association to quotations received from Eastern connections, without inquiring whether the rates quoted were published rates or not, thus making up a through rate which they could quote to their patrons which would be lower than the combination of the published tariff rates. In this manner they would frequently secure considerable business before their competitors who were quoting the published rates discovered the way in which they were being "left." If they were not able to discover how the rate was made up, they naturally inferred that the road quoting the rate was cutting the association rates; consequently the temptation was at all times to meet these rates on the ground of "unauthorized competition." The Commissioners, by insisting that open tariff rates shall be made, will aid in preventing demoralization outside of their own territory, and thus do a good work. This decision will not be relished by those lines which have contended that they had the right to make through rates in this manner as long as they did not reduce their own association rate; but that their conduct was both illegal and unjust there would seem to be no doubt. To say that one portion of a through rate is a "proportion," merely, and therefore not required to be published, while the other portion, though published, gives only a part of the rate, is mere verbal jugglery.

Mr. Walker has ordered the Union Pacific to offer all its traffic for division, and not reserve a large percentage, as it now does, under exclusive contracts. He has a famous precedent for his action. It is found in the fourth and fifth chapters of the Acts of the Apostles—"As many as were possessors of lands or houses sold them and brought the prices of the things that were sold, and laid them at the apostles' feet; and distribution was made unto each according as any one had need. But a certain man named Ananias sold a possession, and kept back part of the price, and brought a certain part, and laid it at the apostles' feet. But Peter said, Ananias, why hath Satan filled thy heart to lie, and to keep back part of the price of the land? How is it that thou hast conceived this thing in thy heart? And Ananias, hearing these words, fell down, and gave up the ghost. And the young men arose, wound him up, and carried him out and buried him." Will Jay Gould do likewise? Will he let the young men wind him up and bury him? We fear not. He is not that kind of a man.

"Jay G.
Of the Union P.
Says they didn't know everything down in Judee."

And as for Mr. Walker,—well, Peter never had a salary of $25,000 a year, but he *did* have facilities for getting his ideas about division of traffic carried into effect which a Western commissioner might envy.

On general principles there does not seem to be any good reason why the people of the State of New York who live in the neighborhood of Herkimer, and who wish to visit friends in the vicinity of Malone, shall be compelled to go a long distance round, when there is a chance for them to have a railroad built across-lots for their accommodation. A glance at the map shows, in the Adirondack region, a tract of about 100 miles in width by 150 long, not traversed by any through route; and it is somewhat remarkable that it has remained for so long a time uninvaded by the enterprise of railroad builders. Now, however, there is a serious determination on the part of certain energetic capitalists to build a road through this tract; but they find themselves opposed by some of the friends of the forest preserve, who seem to regard the construction of a railroad as a sure calamity to the forest. Yet it need not be so, if the railroad is limited to the business of a common carrier; as to other business in which the railroad might engage, the State authorities have ample power to interfere and prevent it. The Executive Committee of the Adirondack Park Association has held a meeting and passed a series of five resolutions, which admit that reasonable and necessary railroad facilities should be afforded through the Adirondack region, but urge that, when the privilege of crossing the State land may be accorded, it shall only be on the express condition that such railroad shall refrain from charcoal burning, shall refrain from carrying charcoal, and shall refrain from the transportation of lumber cut from trees in the forest preserve, "unless the same shall have been cut from trees 12 inches in diameter, and felled two feet from the ground." These resolutions seem to be framed and adopted in a spirit of helplessness, or else to "tickle the ears of the groundlings"; for the able gentlemen, "representative of the sentiments of the people in all parts of the State," as the New York *Tribune* says, know well that a common carrier cannot be pledged not to transport any charcoal or lumber which may be offered to it for transportation, but on the contrary must accept the freight. It is not by pledges of the railroad company not to transport the products of the forests, nor by obstructing the construction of the railroad, that the Adirondack forests are to be preserved for the pleasure and benefit of the whole State; for those who now own them may do what they like with their wood, making it into lumber and charcoal if they please. The State must first acquire possession of the property, and when that is done may rightfully impose conditions upon the manufacture and transportation of the products of its forests.

The Meeting Rules of the Standard Code.

The worst disaster in our April accident record, printed in this issue, is that which occurred at Kipton, O., on the 18th. The circumstances attending this collision were such as to raise a question concerning the safety of the rules of the Standard Code for regulating the meeting of trains on single track; and about the only definite criticism of the practice which resulted in this frightful disaster, that has thus far appeared, has been that based on the fact that the road formerly had different, and presumably safer, regulations for meeting. The Lake Shore road does not use the Standard Code, but its general rule for meeting is like that of the Standard in allowing no specific margin of time for errors, and the practice in this case would have been equally possible under the Standard Code. The American Railway Association (Time Convention) can hardly need defense on this point, for its meeting rules had stood the test of time before being adopted, and were agreed to only after clear explanation of their character; nevertheless these rules embody one of the most radical changes in the whole code, and one which conservative men have been the most reluctant to adopt, and it may be worth while to inquire as to the basis of the assumption made by the critics of the Lake Shore.

The radical advance prescribed by the Standard Code on the point under discussion is found in the construction of Rule 85*, which omits the time-honored interval of five, ten or more minutes formerly in universal use. On the face of this rule a westbound train, which gets out of the way at 4:51:59 clears the track for an eastbound train due at 4:52, according to the rule, while on the other hand the eastbound train is at liberty to start promptly at 4:52 whether the westbound has arrived or not. To men accustomed to make the inferior train clear the track five or ten minutes before the other is due, or to require the superior train to wait a similar period if the inferior does not reach the meeting point in season, this seems like a wild innovation, and many roads in adopting the Standard Code have taken pains to insert a rule of their own, continuing the five-minute leeway. The conservative spirit is strong (as illustrated by the fact that one road to-day makes a superior train wait 20 minutes before proceeding on its plain rights), and the action taken in adopting the Standard Code by men of this class indicates that they have not been convinced by anything that the Time Convention has done.

But those who think that safety demands the retention of the old five-minute rule apparently overlook the fact that the Standard Code contains a good substitute for it in Rule 93†. This rule was a hard one to construct, and its form is not in all respects satisfactory, but it needs only a cursory examination to see that the superior train, though permitted to start on time, must move under control; and this, it will be seen, does away with the bugbear which has led people to picture in their minds a locomotive dashing past a carload of passengers at 60 miles an hour only a second or two after the latter has cleared the main track.

The first reason for abolishing the five-minute space was that it was very hard to enforce. In the language of an experienced superintendent, "The men *will not* obey the rule." But the more logical reason is found

* When trains of the same class meet on single track, the train not having right of track must take the siding and be clear of the main track before the leaving time of the opposing train.

† All trains must *stop* at schedule meeting or passing points on single track, if the train to be met or passed is of the same class, unless the switches are plainly seen to be right and the track clear. The point at which a train should *stop* is the switch used by the train to be met or passed in going on the siding. When the expected train of the same class is not found at the schedule meeting or passing point, the train having right of track must approach all sidings prepared to stop, until the expected train is met or passed.

in the fact that in a majority of cases there is not the slightest need of obeying it. At hundreds or thousands of stations on tangents the runner of the superior train can see from thirty seconds to three minutes before reaching the station that the inferior train cannot possibly reach the meeting switch for a similar period *after* the time to which it is limited; that therefore it has lost its right to come at all, and that there is no use in waiting. Taking into consideration this fact, Rule 93 is based on the only possible theory which will apply to all conditions. On long tangents with a clear view it allows trains to run at full speed, as it is perfectly safe to do; on a sharp curve in a cut it compels the superior train to run very slowly, as is necessary in order to give the inferior train a chance to flag and stop it in case the latter is unexpectedly stopped before it gets wholly clear of the main track.

The Standard Code has set forth three principles touching this matter: First, that two watches can be depended upon to within 30 seconds (or, perhaps, within 15 seconds) as well as to within five minutes. Second, that a train need not wait beyond this length of time to allow for mistakes of the men on the opposing train, provided both trains are running under control for a short distance. Third, that if either train is to be run *not* "under control," *the five-minute leeway must be retained.* This last is embodied in Rule 86,* and it is this that the Lake Shore has violated. Its general meeting rule is similar to that of the Standard Code; but in making a special rule on the time-table for the benefit of the fast mail train it suspended the operation of the principle found in Rule 93 and omitted to substitute for it the safeguard found in Rule 86. A special rule was made allowing train 14 practically to proceed regardless of all trains (thus making it of a superior *class* to train 21), when the general rules of the Standard Code would have afforded the same facility at all places where it is safe to thus run: while if it was desired to save time for No. 14 at places where this is not safe, the only way of doing it that is justified by the Standard Code would be to make all other trains of *inferior class* to 14—that is, require them to clear it five minutes. It would seem from the report of the collision that the engineman of No. 14 could have complied with Rule 93 at Kipton without losing much, if any, time; and if he had done so he would probably have averted the collision. His fireman is perhaps also blameworthy. Under the general rule requiring runners to keep a good lookout the engineman was bound to obey the spirit of Rule 93 wherever possible, whether it was in the letter of his instructions or not. This, in addition to the entire absence of excuse for the fatal carelessness on train 21, makes an awful showing of gross negligence; and as a court or jury would hardly demand so high a degree of protection as is afforded by the staff system or its equivalent, the public will probably exonerate the company from the chief burden of moral responsibility, provided it has taken pains to have the best obtainable conductors and enginemen; but these considerations should not blind any one to the fact that its *rules* in this case are *not* justified by any action of the Time Convention.

* When a train of inferior class meets a train of superior class on single track, the train of inferior class must take the siding and clear the train of superior class *five* minutes.

Variable Economy from Compound Locomotives

The compound locomotive, like everything else, has its peculiar uses. If properly applied to its legitimate field it will be of marked advantage; if not, then it may easily be less economical than the simple engine it replaces. To show the truth of this and at the same time to emphasize other points relative to compounding heretofore discussed, the following analysis of two sets of indicator cards has been made, both sets being taken from locomotives in identical service and at times when as nearly as possible identical work was being done. Both cards of each set are for the same speed.

One set is from the data published last week regarding the very satisfactory showing of the Johnstone compound on the Mexican Central. The other is from a well-known compound in this country which is identical with other engines in the same service as itself except that the others are simple engines. It was from this last class that the simple expansion card, fig. 2, was taken.

The economy of the Johnstone compound was clearly shown to be 25 per cent., for good reasons which will appear later. The economy of the other type we refer to was quite small, and leaned a little toward the wrong side of the balance. Now for the reasons:

Figs. 10 and 12 are taken from the data given last week, and figs. 1 and 2 are from the other locomotives mentioned above. Figs. 10 and 1 show compound, and figs, 12 and 2 simple expansion. An analysis of these cards gives the following.

Fig.	Boiler pressure.	Pressure at cut-off.	Actual cut-off.	Mean effective pressure.	Revolutions per minute.	Weight of steam used per stroke.	Heat units used per stroke.	Heat units used per stroke per horse power generated.	Loss or gain by compounding as shown by cards.
10 Compound.	150	112	76%	87.	60	.584	661	1.397	42 per cent. gain.
12 Simple.	140	120	62%	41.5	60	.824	930	2.423	
1 Compound.	180	150	31%	27.2	200	.216	280	1.107	23 per cent. loss.
2 Simple.	160	100	25%	18.7	200	.260	293	0.897	
				47.4					

This table shows how in the one case where the simple engine was working at 62 per cent. cut-off—manifestly an uneconomical point—the better expansion secured by the compound enabled a possible saving, as estimated from actual cards of 42 per cent. This is reasonable enough; the advantage of greater expansion has been known too long to require explanation here. But it may be that the losses in locomotives entailed by using them at long cut-offs has not been appreciated, and in view of the fact that so much has been said during the last six or eight years about "over-cylindered" engines we are inclined to believe that this point of necessary expansion for economy has to some extent been lost sight of.

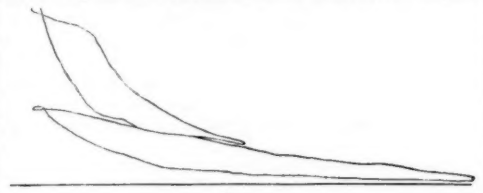

Fig. 1.

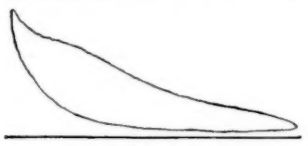

Fig. 2.

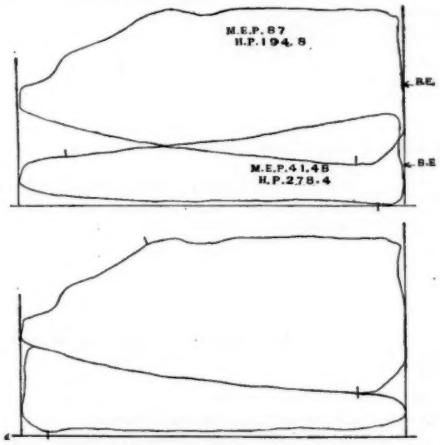

Fig. 10.—Indicator Diagram Mexican Central Engine No. 66.

In the *Railroad Gazette* of Dec. 19, 1890, attention was called to the absolute necessity for larger cylinders for engines designed to work exclusively on heavy grades, and the data now given add to and emphasizes the statements made in that article. The attempt several years since to make a hard-and-fast rule for dimensions of locomotive cylinders was an unfortunate move, as many designers have followed it too religiously. The result is that engines are now running with cylinders altogether too small for the *average* work they have to perform. This is noticeable mostly on roads with heavy grades, as on level lines the average work is such as to give a reasonably short cut-off.

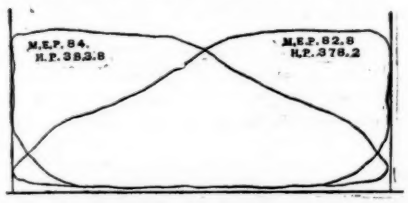

Fig. 12.—Indicator Diagram Mexican Central Engine No. 107.

In the second case given in the foregoing table the simple engine gives the most economical card; there is less loss by compression and back-pressure, and whatever gain there may be as a result of decrease in cylinder condensation is more then offset by the other losses incident to compounding.

Now, these data and arguments are not offered to show that compounding at high speeds has no value, as that is by no means proved, but what is shown is this: There are conditions of service—and this includes as well the condition of the simple engines with which the compound is to compete—where compounding will be of little or no value unless most carefully done and unless all minor advantages of the compound are fully utilized. On the other hand the conditions of service and the peculiarities of the simple engines will often be found such that a test will show greatly increased economy from even an inferior compound.

The compound locomotive is here, and has come to stay, but it is not to be supposed that all experimenters will at first find it more economical than their simple engines. Experience will show the service to which it is best adapted, and the best forms in which to build it. Meantime, the introduction of the compound acts like a club suspended over the ordinary type, and spurs every one on to make the simple engine do its best, and to put it into the form most exactly adapted to the particular service in which it is to be used. All this tends to advance knowledge of locomotives, and is therefore to be encouraged.

Equal Facilities in Through Routes.

A careful examination of the decision in the case of the New York & Northern against the New York & New England and the Housatonic* shows that it will be less wide-reaching in its effects than has been supposed. The difference between this case and that of the Little Rock & Memphis against the East Tennessee, Virginia & Georgia is made quite clear. In the latter case the defendant road had never made any through arrangement with the complainant, and was unwilling to make them, because, by refusing to do so, it could keep the business on its own line. In the New England case the defendant had had such arrangements for a long time, and attempted to withdraw them in order to establish the business on a new line of its own.

It is the belief of the Commission, as expressed in the Little Rock & Memphis case, that Congress "intended" that the independent line should have a fair chance to compete for the traffic. The trouble was, in that case, that Congress had not provided any means for carrying this presumed intention into effect. The Commission had neither power to order the establishment of physical means of interchange nor to enforce arrangements for division of rates. In the New England case neither of these difficulties exists. The facilities are in existence; in fact they are in continued use for traffic not destined for New York City itself. No reason has been alleged why the old division of rates was not satisfactory. What would have happened if the New England had made any such allegations it is not easy to see, but in point of fact the allegation was not made and the company was left in a position which the Commission felt strong enough to order it to abandon, not without pretty serious misgivings on the part of Commissioner Bragg.

It may be that the distinction between the two cases is pretty fine-drawn, but it has an important practical bearing. It will tend to discourage the building of competing lines. Had the Little Rock & Memphis contention been decided in the affirmative, the long lines would have been at the mercy of the short ones. Any new line with good facilities over a short distance might have taken away large shares of traffic from lines already existing. A decision in favor of the complainants in that case would have put an additional premium on the building of parallel roads. On the other hand, had the contention of the New York & Northern been decided in the negative, the short line would have been still more distinctly at the mercy of the long ones. If any company, by building a through line of its own, could make it impossible for a connecting line to do through business at all, the stockholders of the latter road would have no protection whatever against hostile action on the part of the larger system. Such a state of things would be as favorable to parallel-railroad building as the other; only the larger system would be the aggressor instead of the sufferer.

With the two divisions as they stand, the law is neither in favor of the small roads as against the large, nor of the large as against the small; it is in favor of the old roads as against the new. An old section of a large road cannot be compelled to divide business with a new small one; an old small road cannot be deprived

* See *Railroad Gazette*, May 8, p. 330, and May 22, p. 356. Full report received since.

of its business by a new extension of a large one. As we disbelieve in three-quarters of the parallel-railroad building, we are not disposed to quarrel with the general result of the trial.

The Coxe Contract with the Reading.

The firm of Coxe Brothers & Co., miners of anthracite coal and well known in connection with their suit against the Lehigh Valley before the Interstate Commerce Commission for a reduction in anthracite rates, have made a contract with the Philadelphia & Reading. The firm owns large tracts of coal lands, now works seven or eight mines, and has some 40 miles of track, consisting of mine spurs and laterals. These laterals now connect with the Lehigh Valley, the Central of New Jersey and the Pennsylvania. These three companies have uniformly refused to allow Coxe Brothers an arbitrary out of the through rate for their lateral mileage. The contract now made provides that the Reading shall build 10 miles to connect its road with the Coxe lines near Hazleton, Pa., and shall allow the firm an arbitrary out of the through rate. In return the firm agrees to send its tidewater coal, about 1,000,000 tons a year, over the Reading for 30 years from Oct. 1 next. About 750,000 tons of the Coxe coal is now coming to tidewater over the Central of New Jersey. Annually, there are about 500,000 tons of so-called line coal in addition to tidewater coal, "line" coal being the local tonnage sold at near-by cities and towns along the various roads. This brings a little higher price than tidewater and is considered a more valuable trade.

What amount per ton is to be allowed Coxe Brothers as an arbitrary out of the through rate (which is now $1.70 per ton on stove sizes) is not made public, but whatever it is, it, so far as it goes, is a practical rebate, under existing tolls, to that firm. The firm thus obtains indirectly the reduction in the freight rate for which it has been contending for years. On the part of the Reading the advantage is an entrance into Hazleton and a new mining region, not only for coal but for other freights. It is also claimed that this and another contract will add 2,000,000 tons to its traffic and a million or more dollars to its net earnings. In the annual report for 1890, President McLeod hinted that the coal tonnage of the Reading would be increased, the report causing some little anxiety in the trade at the time of its appearance.

The position of the Reading in the anthracite trade is peculiar. Under its former management it bought up coal lands freely, paying good and in some cases extravagant prices and issuing bonds in payment. It thus owned coal lands and mines certain in the future to be very valuable, though some of these were not likely to earn interest on their cost for the time being, because purchased not for active work at the time, but to keep the lands out of the hands of competitors. Thus the Reading stood as owning large coal lands, heavily mortgaged, but without the facilities for getting the average possible output of its lands to market each year. Its percentage of the whole annual output of hard coal fell under these circumstances from about one-third to one-fifth. Meanwhile Mr. Gowen's policy of carrying the coal company's losses as assets (the coal company is owned by the railroad company), and paying dividends out of the paper profits of the railroad, accumulated a large floating debt and made a reorganization imperative. This reorganization provided for several series of preferred (income) bonds after the first mortgage. The hope of paying interest on these income bonds lies in increasing the profitable tonnage. The Reading has also other improvements under way, an important elevated terminal in Philadelphia, and an outlet at tide for its coal, called Port Reading, on New York Bay, to be connected with the Reading system at Bound Brook, N. J. When this is completed the Reading tidewater coal, now carried over the Central of New Jersey from Bound Brook, will go to Port Reading. This Port Reading enterprise will cost several millions and to be successful will need the largest possible tonnage to be given to it. The preference bonds of the Reading provide that no other fixed charge shall be put ahead of them. Of course this will not prevent an arrangement for giving to Port Reading the proportion now received by the Central of New Jersey, yet the easiest way to quiet all possible legal complications would be to make Port Reading so successful of itself and in its effects upon the old road as to silence all opposition. To do this a still larger tonnage of coal than usual will be necessary. Thus everything is forcing the Reading toward a larger tonnage of coal than for the past few years.

It is exactly here that strenuous opposition will manifest itself. The percentage of the total output which Reading has lost during the last decades, has been gained by the other coal carrying roads. These are active, aggressive, and have strong financial credit. The coal trade is kept from complete demoralization as to prices only by rigid adherence to the agreed percentages of the output, the amount of coal which the market will take from time to time being determined by a council of sales agents. This total output, when decided upon, fixes each road's proportion for the month. If any road mines more than its proportion, it must hold back later on; if it shows any signs of openly mining more than its quantity the other roads at once mine enough to keep up with it. As long as this condition of things continues it does not matter which way Coxe Brothers' coal goes, the carrying road counts it in its quota. If the Coxe coal is changed from Jersey Central to Reading, the former will mine and carry just so much more of other coal, while the Reading will be called upon to even up by carrying just so much less. These competitors of Reading—the Delaware, Lackawanna & Western, the Lehigh Valley, the Delaware & Hudson—say they will not yield a fraction to Reading, and if Reading should persist in increasing its percentage by adding the Coxe coal to its old proportion, they will also mine so much more. On the other hand, it would be folly for the Reading to contract to give Coxe Brothers an arbitrary and thus reduce its own revenue, unless the million tons were to be in addition to the old tonnage. The situation therefore points directly to war next October or whenever the new contract is put into actual operation. How the matter will finally adjust itself no one can now foresee.

April Accidents.

Our record of train accidents in April, given in this number, includes 67 collisions, 108 derailments and 6 other accidents, a total of 181 accidents, in which 56 persons were killed and 149 injured. The detailed list printed on another page contains accounts of only the more important of these accidents. All which cause no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:			
Rear			26
Butting			19
Crossing and miscellaneous			22
			— 67
DERAILMENTS:			
Broken rail	1	Track repairers	2
Loose or spread rail	5	Misplaced switch	6
Broken bridge	7	Careless running	4
Defective switch	7	Bad loading	3
Defective frog	1	Cattle on track	5
Broken wheel	2	Landslide	1
Broken axle	10	Malicious obstruction	5
Broken truck	4	Purposely misplaced switch	1
Fallen brakebeam	4	Sanddrift	1
Broken car	1	Unexplained	36
Bent axle	1		—
Open draw	1		108
OTHER ACCIDENTS:			
Boiler explosion			5
Other causes			1
			— 6
Total number of accidents			181

The causes of collisions, where given, were as follows:

	Rear.	But- ting.	Crossing and other.	Tot'l.
Trains breaking in two	6	..	.	6
Misplaced switch	2	1	4	7
Failure to give or observe signal	3	1	3	7
Mistake in giving or understanding orders	..	3	..	3
Miscellaneous	6	6	3	15
Unexplained	9	8	12	29
Total	26	19	22	67

A general classification shows:

	Collisions.	Derailments.	Other Accdts.	Total.	P.c.
Defects of road	..	21	..	21	12
Defects of equipment	6	22	5	33	17
Negligence in operating	32	16	..	48	26
Unforeseen obstructions	..	13	1	14	8
Unexplained	29	36	..	65	37
Total	67	108	6	181	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other Accdts.	Total.
Passenger	27	25	1	53
Freight and other	94	85	5	184
Total	121	110	6	237

The casualties may be divided as follows:

KILLED.	Collisions.	Derailments.	Other Accidents.	Total.
Employés	29	21	2	52
Passengers	..	..	..	..
Others	3	1	..	4
Total	32	22	2	56
INJURED.				
Employés	54	41	5	100
Passengers	20	22	..	42
Others	3	4	..	7
Total	77	67	5	149

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	..	16	8	5
Defects of equipment	..	..	4	7
Negligence in operating	..	23	32	57
Unforeseen obstructions and maliciousness	..	..	5	22
Unexplained	..	3	3	9
Total	..	42	52	100

Thirty accidents caused the death of one or more persons each, and 33 caused injury but not death, leaving 118 (65 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with April of the previous four years shows:

	1891.	1890.	1889.	1888.	1887.
Collisions	67	64	36	49	28
Derailments	108	67	52	83	58
Other accidents	6	4	5	4	4
Total "	181	135	96	136	90
Employés killed	52	13	22	33	26
Others "	4	2	23	9	5
Employés injured	100	81	60	107	74
Others "	49	59	26	84	34
Passenger trains involved	53	45	43	46	26
Average per day:					
Accidents	6.03	4.50	3.19	4.53	3.00
Killed	1.87	0.50	1.50	1.40	1.37
Injured	4.97	4.67	2.77	6.20	3.60
Average per accident:					
Killed	0.309	0.111	0.483	0.308	0.455
Injured	0.823	1.037	0.924	1.368	1.200

We have no record of any passenger being killed in April. The worst accident of the month was that at Kipton, O., which was discussed in our issue of April 24 and is touched upon in another column to-day. Mail clerks and express messengers are frequently the victims of collisions, because they are generally in the front portion of the train, but in our summary we include them under the head of employés. Several accidents in the month's record are of a very serious character, killing three or more trainmen each, but are not, so far as the reports indicate, characterized by unusual circumstances.

The wrecking of a freight train on account of the failure of a trestle at Fallston, Md., on the Maryland Central on the 16th, attracted a good deal of attention in that state, and has finally been published throughout the country in consequence of the indictment of the directors of the road for manslaughter in connection with the wreck. This feature of the case will be watched, as the general question of punishing directors, under the criminal law, for faults of management has been widely discussed since the arrest of the directors of the New York, New Haven & Hartford on account of the collision in New York City in February. Although there is no railroad commission or other technical tribunal in Maryland, this case seems thus far to have been wisely attended to by the authorities, the State Attorney having taken prompt action in the matter and a careful examination of the trestle as well as of other structures on the road being made by the County Surveyor. The coroner's jury censured the railroad for neglect, basing the verdict on the bald statement that the train fell in consequence of decaying timbers, but the report of the County Engineer is more moderate in tone, saying that while the trestles are not entirely unsafe there are "defective timbers which should be at once removed." It is said that one of the witnesses before the jury, an ex-president of the company, testified that the trestle was unsound a year ago, and that he had called attention to the fact. The jury also censured the company for delay in sending relief to the scene of the accident. The crime evidently involved not merely the engineering questions touching the construction or maintenance of the bridge, but also questions as to the weight of the rolling stock and the speed at which it was run over the structure.

An accident which, according to the reports, was very similar to this occurred about the same time near Mt. Sterling, O. The accounts state that the rule of the road forbade the use of heavy freight engines on this division, but that latterly they had been gradually introduced, apparently without careful consideration by responsible officers.

A train of three cable cars was run into by a switching engine of the Pennsylvania in Philadelphia on the 1st, knocking one of the cars off the track, but doing no very serious personal injury. On the 12th a train of the Mexican Central encountered a hailstorm near Terreon, which was so severe that every pane of glass on one side of the train was smashed, and the paint was battered off the roofs. The account states that several passengers were injured.

In publishing the description of the proposed buildings of the Grant Locomotive Works at Chicago, in the *Railroad Gazette* of May 15, the name of the firm which made the plans, Messrs. Raeder, Coffin & Crocker, of Chicago, was by an unintentional oversight omitted. The error is the more to be regretted as the character of the work done by the architects is accorded exceptional praise by experts who have examined the plans.

The Interstate Commerce Commission has filed in the United States Circuit Court for the Eastern District of Pennsylvania a complaint against the Lehigh Valley road, asking for the enforcement of the recent order of the Commission on the petition of Coxe Bros. & Co., directing the reduction of anthracite coal rates from the Pennsylvania mines to New York Harbor. The complaint sets forth the facts of the case and the proceedings before the Commission in detail, and shows copies of freight bills presented since April 20 demanding payment for transportation at the old rates, which was refused by Coxe Bros. & Co.; and an injunction restraining the road from further violation of the order is asked for.

The Committee on Safety Appliances appointed at the National Convention of Railroad Commissioners will gather information on the following subjects: The total number of freight cars controlled by each company and how many are equipped with automatic couplers; the kinds of couplers used and the number of cars with each kind; the kind of couplers each company now causes its freight cars to be equipped with; the number of freight cars each company has equipped with train brakes and the names of the brakes used; the number of locomotives each road controls, and the number equipped with driving-wheel brakes.

The opinions of railroad officers on the general subject will also be asked, and a circular requesting information will be sent to all roads engaged in carrying interstate commerce. Another circular will be sent to organizations of railroad officials or employes. Edward A. Moseley, Secretary of the Interstate Commerce Commission.

will act as Secretary of the Committee. The Committee will meet in New York City on Nov. 10.

The death list of our train-accident record for the present month will be swelled by two accidents which in some respects make an unfair addition to the category of accidents which may be classed as strictly incident to the operation of trains; though as our record includes accidents to trains from all extraneous as well as other causes, these after all come legitimately within it. The killing of passengers by the Johnstown flood is an instance of a similar class heretofore. The cases we now refer to are the seven men killed while fighting fire on the Sinnemahoning Valley road, May 10, and the gang of Italians, last reported as 14, killed by the explosion of dynamite near Tarrytown, N. Y., on the 19th. This was at first reported as an unexplained explosion in a standing car, but it now appears that an engine and one platform car had been sent for a gang of workmen (engaged in excavating for a third track on the New York Central) and was returning with them, when, while the train was moving at considerable speed, fire was discovered among the boxes on the car. The cause of the fire and the way in which it was communicated to the explosives is still undetermined. One story is to the effect that the workmen utilized their time on the short journey to attach exploders to the dynamite cartridges, and that a man holding prepared cartridges in his arms dropped some of them.

The New York Rapid Transit Commissioners have agreed upon a conditional plan for a railroad 18 miles long, and have published it for the purpose of eliciting comment and criticism. The resolutions describing it are given below. It is understood that the high viaduct and the "deep tunnel" plans have both been rejected on account of their great cost, and it will be observed that the scheme as adopted is one of which the engineering details have been quite fully discussed heretofore. The most interesting point is the definite exclusion of steam locomotives. The resolutions, slightly condensed, are as follows:

Resolved, That any additional rapid transit system for the city of New York should embrace the following essential features:

1. That it should provide not only for present needs, but be susceptible of such expansion as future growth may require.
2. That it should provide for express trains at high speed for long distances and for way service for intermediate distances, upon separate tracks, so located as to facilitate at proper intervals an exchange from express to local, and from local to express trains.
3. That the surface of the streets should be obstructed to the least possible extent; and that wherever surface ground is required, private instead of public property should be used if practicable.
4. That the first lines to be constructed should be on or near the important thoroughfares, coincident with the main arteries of travel.

Resolved, That as meeting these requirements in the manner most feasible for the west side of the city, this Board hereby approves of a plan for an underground four-track railway under Broadway from a point at or near South Ferry to Fifty-ninth street; thence under the Boulevard to a point at or near 169th street (with a viaduct at Manhattan street); thence under Eleventh avenue, or under private property immediately to the west thereof, to such point as the contour of the ground may determine; thence by viaduct across the Spuyten-Duyvil Creek, and by tunnel or by viaduct to the city limits.

Resolved, That the general plan of construction from South Ferry to 42d street shall be either by double deck-tunnel, with two tracks upon each deck, or four tracks on the same level, as may be found most expedient; the whole to be at such depth as not to disturb the surface or endanger building foundations. From 42d street north, to be four parallel tracks upon the same level, as near the surface of the street as practicable when in tunnel, but not in open cut at any point.

Resolved, That the stations shall be upon property acquired for the purpose, and shall be provided with elevators wherever the platforms shall be 20 ft. or more below the curb line.

Resolved, That the motive power shall be electricity or some other power not requiring combustion within the tunnel.

Resolved, That the engineers of this Board be instructed to make surveys and prepare detail plans and submit the same promptly to this Board for its further action.

TECHNICAL.

Manufacturing and Business.

Recent sales of the larger sizes of Westinghouse engines, as reported by the Boston house of Westinghouse, Church, Kerr & Co., have included one 250 h. p. compound to the Fairchild Paper Co.; one 100 h. p. to Frank Jones, President of the Boston & Maine R. R.; two 75 h. p. to the Olcott Falls Paper Co.; three 80 h. p. compounds to Howland & Ellis, for an electric railroad in Burlington, Ia., and five 5 h. p., six 10 h. p., four 15 h. p., one 25 h. p., one 35 h. p., one 45 h. p., one 60 h. p., one 100 h. p., one 125 h. p., two 150 h. p. and one 200 h. p. for a complete subdivided power plant in the bleachery and print works of the Dunnell Co., at Pawtucket, R. I. They are meeting an active demand for the new steam loop.

The Boyden Brake Co. has opened an office in the Rookery building, Chicago. Mr. C. L. Sullivan, the General Superintendent of the company, will be in charge for the present. The Boyden company expect to have an interesting exhibit at the Cape May convention. The company reports the receipt of several orders for brakes recently.

George W. Roberts, of Tacoma, Wash., has contracted with the Great Northern for the use of the Roberts tracklaying machine on the Seattle & Northern between Seattle and Wooley Junction, Wash.

C. A. Hotchkiss, of Cleveland, O., and the South Ballimore Car Works, are reported to be the principa stockholders in a stock company recently organized to erect bolt and nut works at Curtis Bay, near Baltimore, Md.

The Corrugated Wheel Co., of Chicago, has been chartered with a capital stock of $100,000 to manufacture car wheels. The incorporators are W. E. Williams, G. B. Lathrop and S. T. Edwards.

Sidney Dillon, President of the Union Pacific, is reported as saying that it has been decided to increase the capacity of the shops at Omaha, to again manufacture car wheels and to re-establish the foundry.

The Centropolis Car & Wheel Works, near Kansas City, Mo., have been sold to the Midland National Bank of Kansas City for $35,000. The works originally cost $150,000, and an effort will be made to reorganize the company and resume business.

The Hallowes Car Axle Box Co., of Jersey City, N. J., has been incorporated to manufacture car axle boxes. The capital stock is $100,000.

The American Tube & Iron Co., of Middletown, Pa., has been awarded the contract for the wrought-iron pipe to be used in laying the natural gas line in Toledo, O. Six-in., 8-in., 10-in., 12-in., 14-in. and 16-in. pipe will be necessary.

The plant of the Tyler Tube & Pipe Co., at Washington, Pa., is now well equipped for the manufacture of boiler tubes, its specialty. The mill department contains an 18 in. Garrison train of rolls, run by a Corliss engine, steam being supplied by Babcock & Wilcox boilers. Two large heating furnaces are used, turning out 56,000 lbs. of iron per turn. The tube mill is 250 × 80 ft. in size, and contains a Swindell & Smythe's regenerative furnace for welding tubes, and also the cutting-off machines. Natural gas is used for fuel. W. P. Tyler is President of the company and D. M. Boyd, Superintendent.

The Standard Emery Wheel Co., Albany, N. Y., whose factory was destroyed by fire some time since, is again in operation. The new four-story buildings cover 70 ft. frontage by 125 ft. deep. The machinery is all new and much of it of a special nature.

The Babcock & Wilcox Co. is erecting for the Schenectady locomotives two 100 H. P. boilers to carry 225 lbs. daily pressure. They are a duplicate of one-half of the plant of four 100 H. P. boilers recently erected at the Baldwin Locomotive Works, Philadelphia, to carry 225 lbs. daily pressure.

Robinson, Rea & Co., of Pittsburgh, have recently completed two casings for rolling machines to be used at the Carnegie Armor Plate Mills, at Homestead, Pa. Each casing is in one piece, and weighs 90,000 lbs. One of the Pennsylvania gun trucks with a carrying capacity of 100,000 lbs. was used in the transportation of the mammoth piece of iron. These trucks have 16 wheels, and are used exclusively for this kind of work. The largest crane at the foundry had only a capacity of 25,000 lbs., but by lifting one end at a time the big casting was put on board the car.

The Universal Radial Drill Co. has recently completed a pipe facing machine built for the Addyston Pipe Works, which is of 60-in. swing, double-headed, and will take in between the heads a length of pipe 17 ft. long, which is held stationary as in cylinder boring, while the heads carry swinging arms provided with sliding tool rests fed by star feeds to do the facing.

Ground was broken last week for the buildings for the new works of the Missouri Malleable Iron Co. in Denverside addition, East St. Louis. They will occupy four blocks and cost about $75,000. The company will employ about 800 men when the works are in full operation. The company will expend $100,000 to $125,000 on these buildings. The property acquired as a site is 1,110 × 564 ft., on which will be erected molding, annealing and shipping rooms, machine shop, core room, boiler room, and tumbling barrel, engine, dynamo and fan rooms. There will be three furnaces and two cupolas at first, and additions to the plant will be made later, so as to bring the daily melt of iron up to at least 75, and probably 100 tons a day. J. C. Nulsen is President of the company, and F. S. Taggart, General Manager.

The Weeks Automatic Car Coupling Co. has been organized in Rondout, N. Y. The officers are as follows: Isaac H. Maynard, President; John Brush, Vice President; Charles Bray, Secretary and Treasurer, and B. C. Andrews, of Boody, McClelland & Co., 57 Broadway, New York City, Chairman of the Executive Committee. The capital stock is $100,000.

Iron and Steel.

The Pittsburgh Malleable Iron Co. will soon erect buildings of iron and brick for its works in Pittsburgh. The works are again in operation after the recent fire, employing 100 men.

The Wilkes Rolling Mill Co. has been organized at Sharon, Pa., by John B. Wilkes and other practical iron men. F. L. Kimberly, of P. L. Kimberly & Co., Ltd., at Sharon, Pa., has donated sufficient ground near his works for the erection of the new plant.

The Ashland Steel Co., at Ashland, Ky., has completed the foundation of its plant, and it is expected that it will be in operation about August.

The Blandon Rolling Mill, at Blandon, Pa., has been sold to the Blandon Iron & Steel Co., a company incorporated under the laws of New Jersey, with a paid-up cash capital of $100,000.

Work has been commenced on the foundations for the buildings of the rolling-mill to be erected by Harris Bros., at Long Lake, near the Minneapolis stock yards. It is expected that the plant will be ready for operation on June 15. The machinery has been ordered from Pittsburgh and Youngstown. The rolling mill company will manufacture bar iron.

The National Malleable Iron Co., of Peoria, Ill., has been incorporated, to manufacture malleable iron and machinery. The capital stock is $100,000. The incorporators are: A. Henry, A. C. Angler, and George A. Willson.

Stephen N. Noble has been appointed General Manager of the Woodstock Iron Co., at Anniston, Ala., to succeed Walter Crafts, resigned.

The work on the rolling-mill at Shenandoah, Va., is being pushed. Nearly three-fourths of the iron superstructure is now completed. Several carloads of rolling-mill machinery have arrived.

The Clifton Furnace, at Jenifer, Ala., after undergoing repairs and being relined, is again turning out its usual car-wheel charcoal iron. A small quantity of this iron has recently been shipped to an English factory, which, it is claimed, takes the place satisfactorily of higher-priced iron used by them heretofore.

The iron furnace being erected at Bristol, Tenn., by the Bristol Steel & Iron Co., under the direction of Mr. R. C. Holliday, engineer in charge, is to be completed in June. The site comprises an area of 20 acres. The furnace proper has a diameter of 17 ft., and is 75 ft. high. The cast house is 60 × 175 ft. The boiler house is to contain 16 boilers. Abraham S. Patterson, of Philadelphia, is President of the company.

The steel plant of the Southern Iron Co., at Chattanooga, has resumed operations. The company has received some orders which will enable it to continue operations for some time. This is the first malleable iron plant erected in the South. The buildings cover 2½ acres of ground. There are eight annealing ovens and a furnace with 20 tons capacity. J. C. Degan, of Springfield, O., is the Superintendent.

The East Lebanon Iron Co., capitalized at $100,000, has been chartered, and will erect works at East Lebanon, Pa.

The Charleston Iron & Furnace Co. has been incorporated at Charleston, W. Va. The company is to deal in iron and mineral paint, and the authorized capital stock is $1,000,000.

C. L. Petrikin, recently Master Mechanic of the East Tennessee, Virginia & Georgia, has been elected President of the Union Iron Works Co., of Selma, Ala., which has been reorganized.

Riter & Conley, of Pittsburgh, have under construction seven large boilers for the steel plant now being built at West Superior, Wis., by the Pittsburgh Iron & Steel Engineering Co. The boilers are known as the submerged flue boilers, and are 10 ft. in diameter by 30 ft. long. Each boiler contains 236 4-in. flues, 20 ft. long. These boilers are built for a working pressure of 150 lbs. per square inch and are said to be the heaviest boilers ever constructed in Pittsburgh. They will weigh, when finished, 40 tons each, and will be transported to their destination in cars especially built for the purpose.

The Midvale Steel Works, of Nicetown, Pa., have succeeded in securing the right to manufacture the Holtzer armor-piercing projectile in this country. The company has just received a $1,000,000 contract to supply the Government with gun forgings and armor-piercing projectiles.

Arrangements are reported to have been completed to locate the Western Iron Co., of Kansas City, manufacturers of bar iron, nuts, bolts, etc., at Kenilworth, Ind., on the Michigan Central. The company will move from Kansas City as soon as the buildings are prepared, and will begin operations with 350 employés.

New Stations and Shops.

The Manhattan Elevated will shortly begin the erection of a new station at Sixty-sixth Street and Ninth Avenue, New York City.

The Dalton Development Co., proposes to erect a foundry and car-wheel works at Dalton, Ga.

J. M. Curry, of Pittsburgh, Pa., and others, are said to propose establishing works for the manufacture of railroad freight cars in Lexington, N. C.

The St. Louis & San Francisco will replace the passenger station recently burned at Monett, Mo., with new buildings to cost about $20,000.

The Boston & Maine proposes to build a large passenger station at Manchester, N. H., and to make other improvements to cost about $500,000.

The Huntingdon & Broad Top road is to erect a new car shop and new foundry building at Saxton, Pa. The new car shop will be 200 ft. long and 73 ft. wide, and built of stone and brick.

The New York, Lake Erie & Western will erect a new station at Port Jervis, N. Y. It will cost about $25,000. In the second story there will be accommodations for the superintendent, road masters and the trainmen.

The addition to the car shops of the Chicago, Milwaukee & St. Paul at West Milwaukee, Wis., is nearly completed. Three hundred more men will be given employment and the capacity of the plant will be increased from four to ten box cars a day.

The New York Central is building new wrecking shops in its yards at West Albany, N. Y. The new shops will give employment to about 200 machinists. The building will be 150 × 100 ft. with large wings, and, when completed, much of the repairing now done at Schenectady and other shops will be done at West Albany.

The John Stephenson Co., of East Twenty-seventh street, New York, has purchased 35 acres of land between Larchmont and Mamaroneck, on the New York, New Haven & Hartford road, and will erect extensive car works on it for building street cars. The company expect to have the new factory working inside of two years.

The New Hamburg-American Steamer "Furst Bismark."

Advance in marine construction is again most handsomely displayed in the new Hamburg-American line steamer "Furst Bismark," lately arrived from Europe on her maiden trip to this country. Her time is 6 days, 14 hours and 15 minutes from Southhampton to New York. The Furst Bismark was built by the Vulcan Shipbuilding Company, of Stettin. She is 502.5 ft. long, 57.5 ft. wide and measures 34.5 ft. from upper deck to keel plate. Her registered capacity is 8,716 tons. She is provided with a pair of triple-expansion engines operating twin screws 18 ft. in diameter and 32 ft. pitch at a rate of 90 revolutions per minute. The cylinders are 40, 67 and 106 in. in diameter and 48-in. stroke. With 91 revolutions per minute the engines are calculated to develop some 2,000 H. P. each and a 20-knot speed. At such capacity her boilers are to furnish steam with the combustion of 280 to 300 tons of coal per day. Her best 24-hour run on the voyage was 498 miles. Her appearance is quite handsome; her cabins and staterooms are fitted up in the latest style and with the most improved accommodations.

The Chignecto Ship Railroad.

The Canadian government proposes to extend for three years the subsidies of this company. The undertaking should have been completed under heavy penalties by July 1, 1890. The government has given notice that the time will be extended till July 1, 1893, and the penalties removed. On the completion of the road the company is to receive an annual bonus of $170,000 for 20 years from the Dominion.

The Prince Edward Island Tunnel.

In the Dominion Parliament last week the Minister of Finance made an addition to his recent statement respecting the estimated cost of the Prince Edward Island Tunnel. He had omitted giving the estimated cost of a tunnel from shaft to shaft simply. The full figures of Sir Douglas Fox would be for a tunnel of 11 ft. internal

diameter from shaft to shaft. £897,500, and for the same diameter, including land tunnel and contingencies, £1,075,200; for 16 ft. diameter from shaft to shaft, £1,652,500, and with land tunnel and contingencies, £1,971,800; for 18 ft. diameter from shaft to shaft, £1,890,000, and with land tunnel and contingencies, £2,252,500.

The Madison Car Works.

The Madison Car Company has completed several of the buildings of its new car works at Madison, Ill., and will probably be ready to begin the manufacture of cars in August. The company owns nearly 50 acres of land at Madison. It is an excellent location. The town is a few miles north of East St. Louis, and is at the eastern terminus of the new Merchant's Bridge. It is within easy reach of Southern pine and Missouri hard-wood lumber, and is close to the Southern pig-iron districts. The capacity of the car works is to be 40 freight cars per day, while they can repair from 100 to 200 cars per day. The dimensions of the buildings are as follows: Foundry, 700 × 125 ft.; blacksmith and machine shop, 750 × 100 ft.; wood-working and erecting shop, 925 × 160 ft. These three buildings are parallel to each other. The buildings are being erected in the most substantial manner, with brick walls and slate roofs, and are arranged in such relations with one another that all materials can be handled with the greatest possible economy of labor. The foundry is practically completed. It is supplied with two cupolas for car wheels and one cupola for soft castings. It will be very shortly started up on castings. The foundry will have a capacity for 450 car wheels per day. In the blacksmith shop no coal is used, the forges being heated by a system of crude petroleum oil. The engine house will contain nine tubular boilers and two Corliss engines, aggregating 1,000 horse power, and also the dynamos for the electric lights for the plant. The dry kilns have a capacity of 50,000 ft. of lumber per day. The repair sheds are 800 × 200 ft., with a capacity af 200 cars daily. The water supply is obtained by artesian wells. A very comprehensive system of railroad tracks has been laid out through the company's yard. They now have 6½ miles of 60-lb. rails laid, and will have 8 by the time their plans are completed. A locomotive has been ordered for yard service from the Baldwin Locomotive Works. The buildings are to be equipped with machinery of modern type. Railroad tracks run down the centre of the shops and turntables are so arranged that materials can be quickly and easily transferred from one building to another. Cars laden with material can be taken into the buildings and unloaded at the machines where the material is to be worked. The officers of the company are: L. M. Rumsey, President; Charles D. McLure, Vice-President; Paul A. Fusz, Treasurer; Joseph G. Miller, Secretary, and T. C. Salveter, General Manager. Mr. Salveter was for many years General Manager of the St. Charles Car Co.

LOCOMOTIVE BUILDING.

Two engines, one of the rapid transit type and one for main line service, have been delivered by the Rogers Locomotive Works to the New York & Northern.

CAR BUILDING.

The New York, Ontario & Western has just put in service a new pay car, built at the shops at Middletown, N. Y. The car is supplied with several sections, a stateroom, private office and office for making payments. It has also ample sleeping accommodations, the berths having been furnished by the Pullman company.

The New York & Northern has received 14 new 70-ft. passenger cars from the Gilbert Car Co., of Troy, N. Y. Some of these are regular passenger cars and others for use on the Yonkers rapid transit trains have seats along the sides of the cars like those on the Manhattan Elevated. There is one combination car and also two parlor cars.

BRIDGE BUILDING.

Bourne, Mass.—Both branches of the Massachusetts Legislature have passed a bill authorizing the construction of a new bridge at Cohassett Narrows, between Wareham and Bourne. There is a disagreement over amendments added by the House making the erection of the bridge mandatory.

Carlstadt, N. J.—The Passaic Park & Improvement Co. has agreed to build the masonry work for a new bridge near this town if the Boards of Freeholders of Passaic and Bergen Counties will contract for the iron work.

Columbus, O.—Proposals are wanted, until June 11, for the erection of a viaduct over the railroad tracks at Leonard avenue. Bids will be received by Frank J. Reinhard, County Auditor.

Dandridge, Tenn.—The Jefferson County Court will probably decide at the July term whether to order the construction of a bridge across Freach Broad River. A commission to report on the project has been appointed.

Fort Smith, Ark.—The completion of the railroad and highway bridge over the Arkansas River at Fort Smith, Ark., was celebrated Wednesday, May 27. This bridge is the longest in the Southwest. It is 2,380 ft. long, has 13 piers, including the draw pier, and contains 3,800,000 lbs. of steel and iron. It has railroad, wagon and foot accommodations. It was built by the Missouri Pacific on its Kansas & Arkansas Valley line. The cost is said to have been $500,000.

Holyoke, Mass.—The special commissioners appointed to hear all parties interested in the new bridge over the Connecticut River at Holyoke, and to apportion the expense of building the same, has begun its hearings. Hampden and Hampshire counties and Holyoke, Chicopee and other towns are represented by counsel. The Hampden County attorney stated that the total cost of the bridge was $171,995; that, deducting sums received, $169,000 is left to be met by the towns in the counties of Hampden and Hampshire. He said the new bridge was demanded by the growth and commercial prosperity of Holyoke and South Hadley, and for this reason the greater part of the expense should come upon these places.

Homestead, Pa.—Work will shortly be started on the new bridge to be built from Homestead to Glenwood by the Pittsburgh Second Avenue electric street line. Engineer J. H. McRoberts has the plans ready. The bridge will be built of iron and wood and will be 1,200 ft. long. It will have six spans and will cost $100,000. It will take nine months to complete the work. The structure will be of the same type as that at Ninth street over the Allegheny, and will cost half as much.

Keokuk, Ia.—J. O. Voorhies and others, of Keokuk, are interested in a proposed high bridge over the Mississippi River at Keokuk for highway purposes. The cost of a cantilever bridge is estimated at $200,000. This sum, it is thought, will build a bridge that will be 55 ft. above high water mark at the Iowa side, from a point begin at First and Main streets, and running to the bluff on the Illinois shore just below the Hamilton depot, a distance of over 5,000 ft.

Morgan, Ala.—The Scuthern Bridge Co., of Birmingham, has been awarded the contract, at $3,750, for building an iron bridge.

Ottawa, Ont.—It is proposed to rebuild Cummings' bridge in this city. James Ashfield can furnish particulars.

Pittsburgh, Pa.—The Department of Public Works has awarded contracts to the Schultz Bridge Iron Co., of Pittsburgh, for the bridge at Lorimer avenue, $23,750, and for the bridge at Schenley Park, $23,265.

St. Louis.—Plans have been nearly completed by the Bridge Department for the proposed new bridge on Kings highway across the railroad tracks. The bridge is estimated to cost $150,000. No appropriation has yet been made. The clearance at the lowest point will be fully 20 ft. and at the highest 40 ft. The Street Commissioner estimates that the bridge can be built 60 ft. wide for $150,000, or 80 ft. wide for $190,000.

Seattle, Wash.—The committee appointed to investigate the matter of bridging the east channel of the Duwamish, as asked for by the Northern Pacific Railroad, has decided in favor of building the bridge.

Sioux City, Ia.—The Iowa Railroad Commissioners have rejected the plans for an 80-ft. viaduct across the railroad tracks. The City Engineer is preparing new plans for a viaduct 60 ft. wide, which it is thought will be approved.

Wichita County, Tex.—Plans and specifications with sealed bids will be received until June 12 for building an iron bridge across the Big Wichita River, about three miles south of Iowa Park. Bids should be addressed to C. E. Reid, County Clerk, Wichita Falls, Tex.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In New York the Supreme Court decides that, although the statute of 1884 authorizing the Supreme Court or county judge to order that a flagman be stationed or gates erected at the crossing of a street, highway, etc., by a railroad prescribes no penalty for disobedience of such order, an indictment may be maintained against a railroad company neglecting to comply thereiwth, under Pen. Code N. Y., § 154, declaring every willful omission to perform a duty enjoined by law upon any public officer, or upon any person holding a public trust or employment, where no special provision is made for the punishment of such delinquency, punishable as a misdemeanor.[1]

In Kentucky it is ruled by the Court of Appeals that a provision is a railroad charter limiting to six months the time within which actions must be brought against it for killing live stock on its track is constitutional.[2]

In Nevada the Supreme Court holds that unsurveyed lands are part of the public domain, and the company has no right to the possession of any particular tracts, and it has therefore no possessory interest subject to taxation.[3]

In Tennessee a railroad charter provided "that in the absence of any contract with the said company in relation to the land through which the said road may pass, signed by the owner thereof or his agent, . . . it shall be presumed that the land upon which the said road may be constructed, together with a space of 100 ft. on each side of the centre of said road, has been granted to the company by the owner thereof, and the said company shall have good right and title thereto . . . as long as the same be used only for the purpose of said road." The Supreme Court decides that the interest acquired by the company is only an easement, and the landowner, in whom remains the fee, may make any use of the land, subject to the easement, that is not inconsistent with the railroad company's use of the same.[4]

In a case in the Supreme Court of the United States a railroad mortgage given to secure the payment of bonds provided that, on default continuing for 60 days in the payment of interest, the principal of all the bonds should become immediately due, and that, upon request of 75 per cent. of the holders of the bonds, the trustee should take possession of the property and operate it for the benefit of the bondholders, and that upon like request he should proceed to foreclose the mortgage and sell the property to the highest bidder for cash. It was also provided that nothing contained in the instrument should be construed to prevent or interfere with a foreclosure by any court of competent jurisdiction. The Court decides that the trustee could maintain a bill to foreclose the mortgage upon the occurrence of a default, without averring or proving a request by 75 per cent. of the bondholders, as such request was necessary only in case the trustee wished to proceed to foreclosure, or take possession *ex mero motu*, without the intervention of any court.[5]

In Florida it is held by the Federal Court that a receiver of a railroad in Florida, where discrimination in freight rates is a criminal offence, has no right to make such discrimination.[6]

Carriers of Goods and Injuries to Property.

In the Federal Court it is held that, where a carrier, after informing the owner of goods delivered to it for transportation that they will be held at place of receipt till the freight charges are prepaid, ships the goods without payment, and without notice to the owner, it is liable for damages resulting from such permature shipment.[7]

In Georgia the Supreme Court rules that a railroad engaged in the transportation of horses from one state to another, which keeps them confined in a car for more than 28 consective hours without unloading them for rest, water or food, in violation of the Federal statute, is guilty of a negligence *per see*, and is liable, not only for the penalty provided in said section, but also for any damage or injury that may be thereby sustained by the owner of the stock. The railroad is not excused by the fact that its stockyards, at one of its intermediate stations, were on fire when the train arrived there, nor by the fact that the owner's servant in charge of the horses was not sufficiently diligent in urging the railroad employés for permission to unload the horses for the purpose of feeding and watering them.[8]

In Texas, cattle were received to be transported from a point in Texas to Chicago, the bill of lading providing that the carrier should be liable only while the cattle were on its own road. The road over that was wholly within the state, and the delay was caused by the refusal of the connecting lines to receive the cattle, on account of a strike on their roads. The Supreme Court holds that the provisions limiting the time in which suit could be brought and releasing the carrier from liability for delay caused by strikes are valid, whether the contract of shipment be considered as interstate or as one to be wholly performed within the state.[9]

In New Jersey the Supreme Court holds that where land is taken for a street compensation is made once for all, and the public acquire the right to use it for travel, not only by such means as were in use when the land was acquired, but by such other means as new wants and the improvements of the age may render necessary. Placing poles in the middle of the street for the purpose of using electricity for streetcar propulsion does not impose a new servitude on the land in the street, but is within the scope of the public easement, and does not therefore violate any right of the abutting owner, in whom is the fee of the street.[10]

In New York the Supreme Court rules that an abutting owner is not deprived of his right to compensation, as on the ground of acquiescence, by merely failing to interfere to prevent the erection of the railroad and its subsequent use.[11]

Injuries to Passengers, Employes and Strangers.

In New York the plaintiff purchased from defendant's agent a ticket for a seat in defendant's drawing-room car. Having lost it, he applied to the agent for another. This the agent refused, as the diagram showing the seats for which tickets had been issued was no longer in his possession, but he gave plaintiff his personal card, on which he wrote and signed a statement that plaintiff held such seat. Plaintiff presented the card, with the explanation, to the conductor of the car, but he refused to permit plaintiff to occupy the seat, although it was marked on the diagram as sold and no other person had claimed it, and informed plaintiff that he must pay for the seat or leave the car, whereupon plaintiff passed into a common car and continued there to the end of his trip. The Supreme Court holds that the exclusion of plaintiff from the seat was unreasonable, and defendant was liable in damages sufficient to compensate plaintiff for the injury.[12]

In Mississippi a passenger on a train, after being carried beyond his station while asleep, was awakened, and, at his request, the train was stopped that he might get off and walk back. While so walking he narrowly escaped being run into by a freight train on a trestle. He was afterward sick from the effects of the excitement. The Supreme Court rules that he had no redress against the company, although the conductor misled him as to the exact place where the train was when he got off.[13]

In a case in the Federal Court the plaintiff bought a ticket, and was told by the agent that he could ride on a particular train. The conductor had not been informed of the order to carry, and ejected the plaintiff on a dark night while the train was running at a dangerous rate of speed. The Supreme Court rules that the case was a proper one for exemplary damages.[14]

In Texas the Supreme Court holds that where a car inspector negligently fails to discover that a foreign car running on the road is in bad order, and to report it for repairs, the company is liable for injuries to a brakeman caused by the defect.[15]

In New York the deceased was killed at a place where three tracks, guarded by gates, crossed a street. A train standing on the middle track obstructed the view. When deceased arrived at the crossing the gates were closed for a passing train. He waited for the gates to open, and just after passing the middle track he was struck by an engine and tender backing at an unlawful rate of speed down the third track, and concealed from view by the standing train. The Supreme Court decided that deceased, having waited for the gates to open, and seeing a team enter the opposite side of the crossing, had a right to take it for granted that the crossing was safe; and his failure, after passing the standing train to stop and look both ways is not such conclusive evidence of contributory negligence as will warrant the Court in taking the case from the jury.[16]

In Indiana the Supreme Court rules that the owner of horses and a wagon, injured, while in charge of his servant, by collision with a railroad train, is responsible for the conduct of the servant at the time; and if the latter did not exercise due care the master cannot recover for the injuries.[17]

[1] People v. Long Island R. Co., 12 N. Y. Supp. 41.
[2] Lucas v. Kentucky Cen. R. Co., 14 S. W. Rep. 965.
[3] State v. Central Pac. R. Co., 25 Pac. Rep. 442.
[4] E. T., V. & G. Ry. Co. v. Telford, 14 S. W. Rep. 776.
[5] Morgan's L. & T. R. & S. S. Co. v. Tex. Cent. R. Co., 11 S. C. Rep. 61.
[6] Cutting v. Fla. R. & N. Co., 43 Fed. Rep. 747.
[7] Campion v. Canadian Pac. Ry. Co., 43 Fed. Rep. 775.
[8] Nashville C. & St. L. R. Co. v. Heggie, 12 S. E. Rep. 363.
[9] Gulf, C. & S. F. Ry. Co. v. Gatewood, 14 S. W. Rep. 913.
[10] Halsey v. Rapid Transit Co., 20 Atl. Rep. 859.
[11] Mattlage v. New York El. R. Co., 11 N. Y. Supp. 482.
[12] Buck v. Webb, 11 N. Y. Supp. 617.
[13] Wilson v. N. O. & N. E. R. Co., 8 South. Rep. 330.
[14] Fell v Northern Pac. R. Co., 44 Fed. Rep. 248.
[15] Int. & G. N. R. Co. v. Keenan, 14 S. W. Rep. 638.
[16] Oldenburg v. New York Cent. & H. R. R. Co., 11 N. Y. Supp. 689.
[17] L., N. A. & C. Ry. Co. v. Stommel, 25 N. E. Rep. 863.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cape May & Delaware Bay, guaranteed annual dividend of 8 per cent., payable in quarterly installments.

Cheshire, semi-annual, $3 per share, payable July 15.

Northern Pacific, quarterly, $1. per share on the preferred stock, payable July 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Potomac, annual, Baltimore, Md., June 3.

Belleville & Southern Illinois, annual, Belleville, Ill., June 2.

Canada Southern, annual, St. Thomas, Ont., June 23.

Chesapeake, Ohio & Southwestern, special, 56 East Court, Memphis Tenn., June 2.

Chicago, Burlington & Northern, annual, La Crosse Wis., June 10.

Chicago & Eastern Illinois, annual, Chicago, Ill., June 3.

Chicago Junction Railway & Union Stock Yards Co., annual, Chicago, Ill., July 2.

Chicago & Northwestern, annual, Chicago, Ill., June 4.

Chicago, Rock Island & Pacific, annual, Chicago, Ill., June 3.
Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 6.
Cincinnati, Hamilton & Dayton, annual, Cincinnati, O., June 16.
Des Moines & Fort Dodge, annual, Des Moines, Ia., June 4.
Duluth, South Shore & Atlantic, annual, Marquette Mich., June 4.
Florida Central & Peninsula, special, Jacksonville, Fla., June 1.
Georgia Pacific, special, Birmingham, Ala., June 20, to authorize the execution of an equiment mortgage.
Green Bay, Winona & St. Paul, annual, Green Bay, Wis., June 3.
Keokuk & Des Moines, annual, Des Moines, Ia., June 3.
Lewisburg, Centre & Spruce Creek, annual, 233 South Fourth sreet, Philadelphia, Pa., June 9.
Michigan, Midland & Canada, annual, Detroit, Mich., June 4.
Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 10.
Minneapolis, St. Paul & Sault Ste. Marie, annual, Guaranty Loan Building, Third street and Second avenue south, Minneapolis, Minn., June 2.
Morris & Essex, annual, Hoboken, N. J., June 24.
Ogdensburg & Lake Champlain, annual, Ogdensburg, N. Y., June 17.
Ohio Valley, annual, Henderson, Ky., June 2.
Oregon Improvement Company, annual, Seattle, Wash., June 15.
Oregon Railway & Navigation Company, annual, Portland, Or., June 15.
Portland, Saco & Portsmouth, annual, Kittery, Me., June 1.
Portsmouth, Great Falls & Conway, annual, Portsmouth, N. H., June 1.
Rensselaer & Saratoga, annual, Waterford, N. Y., June 3.
St. Joseph & Grand Island, annual, Elwood, Kan., June 9.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 1.
St. Paul & Sioux City, annual, St. Paul, Minn., June 6.
Sarnia, Chatham & Erie, annual, St. Thomas, Ont., June 3.
Toledo, Canada Southern & Detroit, annual, Detroit, Mich., June 4.
Toledo, St. Louis & Kansas City, annual, Toledo, O., June 10.
Vermont & Massachusetts, annual, 53 Devonshire street, Boston, Mass., June 3.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Mechanical Engineers will hold its next meeting at St. John's Hall, Masonic Temple, Providence, R. I., June 16 to 19.

The *American Institute of Mining Engineers* will hold its next meeting at Cleveland, O., June 2.

The *Master Car Builders' Association* will hold its annual convention at the Stockton Hotel, Cape May, N. J., commencing June 9, at 10 o'clock a. m.

The *American Railway Master Mechanics' Association* will hold its annual convention at the Stockton Hotel, Cape May, N. J., beginning at 9 a. m., June 16. Members wanting rooms reserved are requested to apply to the Secretary.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union Station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street New York

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursdays at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

American Society of Mechanical Engineers.

The twenty-third meeting of the society will be held in Providence, R. I., June 16 to June 19. The sessions will be held at St. John's Hall, Masonic Temple, adjacent to the Narragansett Hotel, which will be the society's headquarters during the meeting. During the session the following papers will be read: Two rope-haulage systems, by R. Van A. Norris; Premium plan of paying for labor, F. A. Halsey; Tests of a triple expansion engine, J. T. Henthorn; Belt dynamo-meter, S. P. Watt; A new belt-testing machine, G. I. Alden; Flexure of thin elastic rings, De Volson Wood; Applications of Hirn's analysis to engine testing, R. C. Carpenter; Applications of Hirn's analysis to multiple engines, C. H. Peabody; Notes regarding calorimeters, R. C. Carpenter; Jet propulsion, and Performance of a steam reaction wheel, J. B. Webb; Heat transmission through cast-iron plates pickled in acid, D. Royse; Steam engine efficiencies, R. H. Thurston; Effect of the steam jacket on cylinder condensation, W. W. Bird; Method of dividing an index plate in 1,000 equal parts, and A machine for cutting perfect screws, W. A. Rogers; Steel castings, H. L. Gantt; Manganese steel, H. M. Howe; Mechanical stokers, W. R. Roney; Some experiments with a screw bolt, J. McBride; A blast furnace blowing engine, F. W. Gordon, and Comparison of economy of compound and single-cylinder Corliss engines. D. S. Jacobus. The local committee has arranged for visits to the Gorham Mfg. Co.'s works and the Rhode Island Locomotive Works on Tuesday afternoon, and to the works of the Brown & Sharpe Mfg. Co., the W. A. Harris Steam Engine Co., and Armington & Sims Engine Co. on Wednesday afternoon, and the Corliss Steam Engine Co., Rhode Island Tool Co., and American Screw Co.'s works on Friday morning. Other business houses have extended invitations to the society to visit their shops. Excursions are arranged for Thursday afternoon and also for Friday afternoon.

PERSONAL.

—Mr. R. H. Hood, Chief Engineer of the Seaboard Air Line System, has resigned that position.

—Mr. Alfred P. Boller, of New York, was recently elected a member of the English Institute of Civil Engineers.

—Mr. William N. Mitchell, General Superintendent of the Lynchburg & Durham, of Virginia, resigned that position last week.

—General John M. Corse has decided not to accept the office of General Manager of the Flint & Pere Marquette recently offered him.

—Mr. W. W. Eayres, of St. Louis, late Resident Engineer of the Terminal Association of St. Louis, has been elected General Manager of the Wheeling Bridge & Terminal Railway Co.

—Mr. J. M. Barnard, Assistant General Manager of the Cleveland, Cincinnati, Chicago & St. Louis, whose headquarters are at Indianapolis, has tendered his resignation.

—Mr. N. Irish, who has been General Superintendent of the Cornwall & Lebanon road for several years, and who was formerly General Freight and Passenger Agent also, has resigned his connection with the company.

—Col. I. Y. Sage was elected President of the Atlanta & Florida last week. Col. Sage is a well-known southern railroad officer, and was General Superintendent of the Georgia Pacific for six years, resigning in August, 1890.

—Mr. Alexander Swift, a well-known business man of Cincinnati, died suddenly last week in his seventy-eighth year. He was the founder of Swift's Iron & Steel Works in Newport, Ky., from which he retired several years ago.

—Mr. E. H. Barnes, who was for several years Superintendent of the Georgia Division of the East Tennessee, Virginia & Georgia, has been appointed commissioner of the Georgia Car Service Association with headquarters at Atlanta.

—Mr. Angus Sinclair, Secretary of the American Railway Master Mechanics Association, has been recently appointed Master Mechanic of the Mohawk Valley & Northern. This appointment will not interfere with the duties of any of Mr. Sinclair's present offices.

—Mr. James C. Converse, President of the National Tube Works, of McKeesport, Pa., and formerly a prominent merchant of Boston, died in Greenfield, Mass., May 25. Mr. Converse was one of the projectors of the Hoosac Tunnel, and was also at one time State Railroad Commissioner of Massachusetts.

—Mr. George C. Wilkins, General Agent of the Pennsylvania system in Baltimore, sailed last week from New York for a trip through England and the continent. He expects to be absent about three months. Mr. Wilkins has served the Pennsylvania Railroad in various capacities continuously for 38 years.

—Mr. R. W. Cunningham, President of the Beaver Valley Railroad, the New Castle Wire Nail Co., and a director of the Crawford Iron & Steel Co., died at New Castle, Pa., recently. Mr. Cunningham was also a projector of the Cleveland & Mahoning road, and was identified with many other important business enterprises.

—Messrs. Von Borries and Büte, mechanical officers of the Prussian State Railroads, who have been on a tour of the railroads of the United States during the last six weeks, sail for home on May 30. They express unbounded gratification with the way in which American railroad men have received them and met their wants.

—Col. George G. McWhorter, Railroad Commissioner of Florida, and formerly Chief Justice of the State Supreme Court, died at his country home at Milkins, Fla., last Thursday week. Colonel McWhorter was President of the Railroad Commission from his appointment until he resigned a few weeks ago on account of failing health.

—Mr. A. A. Allen, General Manager of the Chicago & Northern Pacific, the company which controls the Chicago terminals of the Northern Pacific, has resigned, and Mr. S. R. Ainslie, General Manager of the Wisconsin Central, will probably have jurisdiction over the terminals. Mr. Allen was formerly General Superintendent of the Wisconsin Central.

—Mr. A. W. Street, who has been Assistant General Freight Agent of the Missouri Pacific road for over a year, will on June 1 sever his connection with that company to become Manager of the Hoosac Tunnel Fast Freight Line, vice the late J. A. Green.

—Mr. William M. Green, General Manager of the Cleveland, Cincinnati, Chicago & St. Louis, has, it is understood, been granted a long leave of absence. Mr. Green has been in ill health for some time and has been able to give little attention to business for several weeks. Mr. Joseph Ramsey, Jr., Assistant to the President, will probably act as General Manager during Mr. Green's absence.

—Mr. John W. Hobart, the General Manager of the Central Vermont, tendered his resignation of that position last week, after a service with the company of 43 years. He has been General Manager since 1883, and has held various positions on the road from freight clerk to President of some of its leased lines. He has been Station Agent, General Freight Agent for 14 years, General Superintendent for 10 years and General Manager for eight years.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—James Macbeth, Master Mechanic of the West Shore at East Buffalo, N. Y., has accepted an appointment as Superintendent of Motive Power and Rolling Stock of the Adirondack & St. Lawrence. He has tendered his resignation, to take effect June 1.

Atlanta & Florida.—At a meeting in Atlanta, Ga., May 25, a new Board of Directors was elected. The new board is composed of I. Y. Sage, Henry Jackson, T. C. Jackson, Henry Rothschild, of New York; McAllen B. Marsh, W. A. Heath, Joseph N. Moody, John Hightower, Jr., G. N. Tailer, of New York; Edward S. McCandlass, H. M. Atkinson and W. T. Ashford. Col. Sage was elected President.

Bangor & Aroostook.—Moses Burpee, Chief Engineer of the Atlantic division of the Canadian Pacific, has resigned to become Chief Engineer of this road. His headquarters will be at Bangor, Maine.

Cape May & Delaware Bay.—At the stockholders' meeting, at Cape May, N. J., May 25, William F. Russell was elected President and General Manager; Charles H. Mason, Treasurer, and Randolph P. Russell, Secretary.

Carolina, Knoxville & Western.—H. O. Beattie was this week appointed permanent receiver of this road by the United States Court at Charleston, S. C.

Carolina Midland.—The following officers have been elected by this new company: G. A. Wagener, President, Charleston, S. C.; Mike Brown, General Manager and Treasurer, Barnwell, S. C.; J. C. Keys, Superintendent, Blackville, S. C.; H. R. Walker, Secretary and Auditor, Barnwell; and Maj. Thomas B. Lee, Chief Engineer, Barnwell.

Central Vermont.—An order abolishing the office of general manager was issued May 25. The duties heretofore pertaining to the office of general manager will be performed by Edward C. Smith, Second Vice-President, with headquarters at St. Albans, Vt.

Cleveland Belt & Terminal.—The stockholders of this railway, which is to succeed the Cleveland belt line, are W. J. Rotch, New Bedford, Mass.; George A. Smalley, W. O. Chapman, H. A. Blood, Boston; J. W. Wardwell, Cleveland, O., and A. C. Barstow, Providence, R. I.

Cleveland, Cincinnati, Chicago & St. Louis.—H. M. Waite has been appointed Assistant Engineer on this road to succeed E. A. Hermann, resigned.

Columbia & Puget Sound.—The annual meeting of the stockholders of the road was held in Seattle, Wash., May 19. The Board of Trustees elected officers as follows: W. H. Starbuck, President; C. J. Smith, Vice-President; H. McLellan, Secretary; M. E. Stone, Assistant Secretary. F. H. Prince and J. C. Haines are the other trustees.

Covington & Northern.—S. Wilmer, Alexander Brown, Alex. C. King, Jack J. Spalding, D. O. Smith, H. S. Gan and J. S. Harrison, purchasers of the Covington & Macon road, have incorporated the above road to operate it.

Delaware & Chesapeake.—At the meeting of stockholders this week the following officers were elected: President, George B. Roberts; Secretary, Robert H. Graff; Treasurer, Robert B. Smith. Directors, George B. Roberts, Henry D. Welsh, J. N. DuBarry, John P. Green, D. S. Newham, Philadelphia; James D. Groome, Baltimore; David G. Cummins, Smyrna, Del.; George V. Massey, Dover, Del., and Aswald Tilghman, Easton, Pa.

Duluth, Mesabi & Northern.—The incorporators are: K. D. Chase, Faribault, Minn.; J. T. Hale, S. R. Payne and Roswell H. Palmer, Duluth, and Alfred Merritt, C. C. Merritt, A. R. Merritt, Leonidas Merritt and N. B. Merritt, West Duluth, Minn.

Flint & Pere Marquette.—The annual meeting was held in Saginaw, Mich., May 21. The following Directors were re-elected: W. W. Crapo, Loum Snow, J. W. Mackintosh, F. V. Parker, J. Lewis Stackpole, Lewis Pierce, George Coppell, H. C. Potter, W. L. Webber, H. C. Potter, Jr., and W. H. Tousey.

Fremont, Elkhorn & Missouri Valley.—The annual meeting was held at Omaha, May 22. The directors chosen are Marvin Hughitt, Albert Keep, M. L. Sykes, M. M. Kirkman, J. B. Redfield, Horace Williams and David P. Kimball. There was only one change, Mr. Kirkman taking the place of P. E. Hall, once General Manager.

Gettysburg & Harrisburg.—The Philadelphia & Reading now controls this road. Last week the old Board of Directors and President J. C. Fuller resigned, and in their places President A. A. McLeod of the Reading and these Directors were elected: J. H. Loomis, J. M. Landis, R. Weston, C. C. Midwood, H. T. Narsby and R. Tiel. W. H. Woodward, who has for many years been the Manager and Superintendent of the road, will continue to have charge, and, in addition, will assume charge of the Philadelphia, Harrisburg & Pittsburgh road, with headquarters at Harrisburg, Pa.

Hannibal & St. Joseph.—General Freight Agent Howard Elliott of the Burlington lines, embracing the Hannibal & St. Joseph, St. Louis, Keokuk & Northwestern, Kansas City, St. Joseph & Council Bluffs, and Chicago, Burlington & Kansas City roads, has made the following appointments: J. S. Bartle, Assistant General Freight Agent, with headquarters at St. Joseph, Mo.;

D. O. Ives, Assistant General Freight Agent, with headquarters at St. Louis. J. H. Palmer has been appointed Assistant General Passenger Agent and George H. Dunbar Assistant General Ticket Agent of the lines, with headquarters in St. Louis. C. M. Levey, of Keokuk, Ia., is Superintendent of the St. Louis, Keokuk & Northwestern and of the Eastern Division of the Hannibal & St. Joseph, with headqquarters at Hannibal, Mo.

Long Island.—William H. Blood, Superintendent of the Atlantic City Division of the Philadelphia & Reading, has been appointed Assistant Superintendent of the Long Island road, in the place of C. R. Fitch, resigned.

Louisiana, Arkansas & Missouri.—C. G. Vaughn, who was formerly Assistant Chief Engineer of the New Orleans & Northwestern, has accepted a like position with this company.

Minneapolis Western.—At the annual meeting of the stockholders in Minneapolis, last week, the following directors were elected: J. B. Bassett, President; F. C. Pillsbury, Vice-President: and Samuel Hill, Secretary and Treasurer; W. H. Dunwoody, H. F. Brown, C. A. Pillsbury, Clinton Morrison, W. G. Northrup, F. L. Greenleaf and A. C. Loring.

Missouri, Kansas & Texas.—The annual meeting of the stockholders was held in Parsons, Kan., May 20, 532,634 shares of stock out of 594,050 shares being represented. The old board of directors was re-elected with the exception of the late H. K. Enos, who was succeeded by John D. Rockefeller. The following Directors were elected: John D. Rockefeller, William Dowd, Joel F. Freeman, H. W. Poor, Wm. Bond, Simon Sterne, J. J. De Neufville, Samuel Sloane, Colgate Hoyt and Maynard C. Eyre, New York; H. J. Damarese Owens, Amsterdam, Holland; H. C. Cross, Emporia, Kan.; B. P. McDonald, Fort Scott, Kan.; Lee Clark, Parsons; James C. Thompson, Sedalia, Mo.; J. Waldo, Houston, Tex.

Missouri Pacific.—S. J. Henry, at present Chief Clerk in the Freight Department at St. Louis, has been appointed Assistant General Freight Agent to succeed A. W. Street, resigned.

New York Central & Hudson River.—W. T. McCulloch, Assistant Superintendent of the Western Division, has been made Assistant Auditor of Freight Accounts. J. W. Van Wagner, Superintendent of the Union Railroad of Troy, N. Y., has been made Assistant Superintendent of the Mohawk Division of this road, to succeed F. A. Harrington, promoted to the office of Superintendent. Allen Bourn, who has been Purchasing Agent of the Michigan Central for the last 15 years, has resigned to accept an appointment on this road in charge of the purchasing department.

New York, Lake Erie & Western.—C. R. Fitch, formerly Assistant Superintendent of the Long Island, has been appointed Superintendent of the Eastern Division of this road, to succeed W. W. Stearns, resigned. The appointment is to take effect June 1.

Northern Pacific Terminal.—E. Lyon, Assistant Superintendent of the Columbia & Puget Sound road, has resigned to accept the general management of this company at Portland, Or., vice C. W. Johnson, resigned.

Oregon Improvement Co.—G. J. McCabe, recently Assistant Superintendent on the Seattle & Northern road, succeeds E. Lyon resigned, in a similar position on the Columbia & Puget Sound. A. A. Booth, recently Assistant Engineer in the Seattle office of the Oregon Improvement Co., now has charge of the construction and engineering work on the Olympia & Chehalis Valley road. A circular has been issued abolishing the office of General Freight and Passenger Agent of the company, Col. O. F. Briggs having resigned.

Ohio River.—The following Board of Directors was elected at a meeting at Parkersburg, W. Va., May 21: J. N. Camden, D. H. Payne, E. W. Clark, H. A. Pratt, George W. Thompson, W. P. Thompson, R. H. Browse, J. B. Neal, B. D. Spillman, S. W. Collins, James G. Fair, C. W. Harkness, W. N. Chancellor. The following officers were re-elected: President, G. W. Thompson; Secretary, W. N. Chancellor, and Treasurer, William Trevor.

Pacific Mail Steamship Co.—At the annual meeting these directors were elected: C. P. Huntington, Henry Hart, Calvin S. Brice, Samuel Thomas, Jay Gould, Russell Sage, George J. Gould, Isaac E. Gates and J. B. Houston.

Pemigewasset Valley.—The annual meeting of stockholders was held at Plymouth, N. H., May 25. The following directors were elected: J. J. Bell, Exeter, N. H.; Daniel Saunders and G. W. Hills, Lawrence, Mass.; Joseph W. Campbell, Woodstock, Vt.; Daniel Barnard, Franklin; J. C. Cilley, South Deerfield; J. A. Weston, J. C. French and Henry Chandler, Manchester, N. H.

Pittsburgh, Youngstown & Ashtabula.—The annual meeting was held in Youngstown, O., May 21. The following directors were elected: H. L. Morrison, T. E. Hoyt, Ashtabula; William Mullins, William Thaw, Jr., James McCrea, J. E. Davidson, Pittsburgh; George B. Roberts, J. N. Hutchinson, Philadelphia; Caleb B. Nick, W. Scott Bonnel, J. G. Butler, Jr., Youngstown. The directors elected J. N. Hutchinson, President; S. B. Liggett, Secretary; T. H. B. McKnight, Treasurer.

St. Louis Southwestern.—The office of the superintendent and chief engineer of the company has been abolished. T. W. Kennan, Superintendent, with headquarters at Pine Bluff, Ark., will continue in charge of that company's lines, and will report direct to the General Manager at St. Louis, Mo.

St. Louis Southwestern of Texas.—J. A. Edson, Second Vice-President of the company, with headquarters at Tyler, Tex., has been appointed Superintendent of the road in Texas, and as such will manage the property of said company.

Seattle & Northern.—The annual stockholders' meeting of the company was held May 19, and the following trustees and officers elected: W. H. Starbuck, President; C. J. Smith, Vice-President; H. McLellan, Secretary; M. E. Stone, Assistant Secretary; F. A. Prince, J. C. Haines and P. P. Padden.

Sinslaw & Eastern.—The following are now the officers of the company: George H. Ellsberry, President; A. G. Hovey, Vice-President and Treasurer; J. M. Hodson, Secretary; Isaac Britton, General Manager, and C. B. Reynolds, Attorney. The headquarters are at Eugene, Or.

Toledo, Walhonding Valley & Ohio.—The following are the directors of the consolidated company: Thomas D. Messler, James McCrea, Joseph Wood, J. W. Renner and G. W. Layng, of the Northwestern Ohio, and A. J. Warner, William R. Pomerene, Leander F. McVey, Julius C. Pomerene, Henry C. Herbig and John C. Fisher, of the Walhonding Valley road.

Union Pacific.—P. J. Nichols, who was formerly connected with the Union Pacific, but who has been engaged in business at Omaha for several years, is to be appointed Superintendent of the Nebraska Division of the Union Pacific. He will assume the duties of his office on June 1.

United New Jersey Railroad & Canal Companies.—At the annual meeting of the stockholders at Trenton, N. J., May 26, the following directors were elected: William Waldorf Astor, John C. Baron, Joseph D. Bedle, Samuel S. Dennis, Anthony J. Drexel, Charles E. Green, F. Wolcott Jackson, Thomas McKeon, Thomas Oakes, Robert F. Stockton, Alfred Van Santvoord and John Lowber Welsh.

Virginia & Truckee.—At the recent annual meeting the company elected the following directors and officers: Directors, D. O. Mills, F. G. Newlands, H. M. Yerington, D. L. Bliss, W. E. Sharon, J. W. Eckley, W. H. Blauvelt, W. E. F. Deal and J. E. Wratten. Officers: D. O. Mills, President; H. M. Yerington, Vice-President and General Superintendent, and E. B. Yerington, Secretary.

Wheeling Bridge & Terminal.—The annual meeting was held in Wheeling, W. Va., last week. The following Board of Directors was elected: R. H. Cochran, N. E. Whitaker, W. F. Peterson, W. A. Wilson, Wheeling; Job Abbott, R. B. Ferris, R. H. Rochester, New York; W. B. Thomas, Boston, and A. H. Almstead, Hartford. The directors organized by electing the following officers: President, R. H. Cochran; Vice-President and Chief Engineer, Job Abbott; General Manager, N. W. Eayrs; Secretary and Treasurer, A. L. Ripley.

Wheeling & Connellsville.—The incorporators have elected the following board of directors: W. A. Lynch, Canton, O., and Joseph Speidel, Frank J. Hearne, George Wise, W. A. Isett, Judge R. H. Cochran, W. P. Hubbard, C. A. Robinson and Anton Reymann, Wheeling, W. Va.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Abbeville & Waycross.—The engineers are making a preliminary survey for the northern extension from Abbeville north about 25 miles to Hawkinsville on the Empire & Dublin road.

Baltimore & Ohio.—Some details of the agreement to give the West Virginia Central & Pittsburgh a Pittsburgh outlet over this road have been published. The latter road is to build an extension from Elkins, its present western terminus, southwest to Belington, W. Va., a distance of about 18 miles. To meet this extension the Baltimore & Ohio will widen to standard gauge the present narrow gauge of the Grafton & Greenbrier road. From Grafton to Fairmont the road is part of the main stem of the Baltimore & Ohio, which also controls the road running from the last-mentioned place to Morgantown. From Morgantown, the dispatches state, the Baltimore & Ohio agrees to build a road to Uniontown, Pa., from which place both the Baltimore & Ohio and the Pennsylvania roads run to Pittsburgh.

Bangor & Aroostook.—A preliminary survey was begun for this line last Monday and is now in progress from Brownville Junction on the Bangor & Piscataquis, near Bangor, the eastern terminus of the road. The line is to be continued northeasterly through Patten and Houlton to Presque Isle, the eastern terminus, a distance of about 135 miles. The survey is being made by a party of engineers under Moses Burpee, the chief engineer. This party will complete the survey to Benedicta in Aroostook County. The directors have authorized the president of the company to collect the subscription of Aroostook County of $500,000 to the preferred stock. Over $300,000 additional of the stock is also reported to have been subscribed at Bangor.

Bear Lake & Eastern.—A survey has recently been made for a short extension of this road in Manistee County, Mich., to a connection with the Manistee & Northeastern and the Traverse City extension of the Chicago & West Michigan. The line will be 2½ miles long, and will be an extension of one of the branches now built from the main line north of Manistee, near the north side of the Manistee River.

Beech Creek.—A mortgage for $350,000 was placed on record in Pennsylvania last week by the company in favor of the Knickerbocker Trust Co., of New York. It is reported that the road is to be extended into Cambria County, Pa.

British Columbia.—Representatives from British Columbia are pressing Parliament for a subsidy of $3,200 per mile for the Nicola Valley and British Columbia Southern roads. The latter is to extend from McLeod, on the Calgary & Edmonton, through the Crow's Nest Pass.

Carolina Midland.—John Mackler & Co., of Barnwell, S. C., who are the principal contractors on the extension from Barnwell to Allendale, 17 miles, have about 400 men grading on the route. The tracklaying on the new line will be done by the company, and it is expected to have the road in operation to the connection with the Port Royal & Augusta at Allendale by Aug. 1. About 3,000 ft. of timber trestling will be necessary on the line. The maximum grade is 52.8 ft. per mile and the maximum curves are three degrees. The contract for building the extension and for the equipment has been let to the Southern Investment Co., of Charleston, S. C. After the line has been built to Allendale, it is proposed to build an extension of the northern division from Seivern north to the Richmond & Danville, near Batesburg, about 15 miles.

Central Counties.—The bill introduced in the Dominion Parliament respecting this road makes provision for the division of the work into the following five sections: From Hawkesbury to Glen Robertson, Ont.; Caledonia Springs branch; from South Indian to Rockland; from a point on the Canada Atlantic to the River St. Lawrence, near Cornwall, and the bridge and steam ferry boats across the Ottawa River. Provision is made for the issue of bonds separately for each of the first four sections, not exceeding $10,000 per mile, such bonds to form a first charge upon the respective sections, and upon all the company's property except the rolling stock. Provision is also made for the issue of bonds for each of the first four sections, not exceeding $15,000 per mile, and to be a first charge upon the rolling stock. Provision is made for the issue of bridge bonds to the extent of $600,000. The first section, from Glen Robertson to Hawkesbury, 20 miles, is now under construction.

Central Vermont.—The Venetian and Smith & Brainerd Marble companies propose to build a branch road from their marble quarries, near Pittsford, Vt., to connect with this road or with the Central Vermont Quarry Co.'s road, which connects with the main line. The railroad company will be asked to assist in building the branches.

Chester & Centralia.—Work on the extension toward Centralia from the present terminus on the St. Louis, Alton & Terre Haute at Coulterville is said to be progressing. The track is to be laid to Nashville, 15 miles northwest of Coulterville, early in August.

Chicago, Ft. Madison & Des Moines.—The work of changing the present narrow gauge tracks to standard gauge between Fort Madison and Collett, Ia., a distance of 45 miles, is to begin at once. The rails for the work on a large part of the distance have been delivered along the line of the road.

Consolidated Terminal (Kansas City).—The company was chartered last week by directors of the Kansas City Terminal & Suburban to build a standard-gauge road, commencing at a point in Kansas City on Second street between Holmes and Walnut, thence in a westerly direction to the state line on the south side of the Missouri River, a distance of two miles. The directors are: E. L. Martin, A. E. Stillwell, A. A. Mosher, W. S. Taylor, M. C. Curtis, A. A. Whipple, J. D. McD. Trimble and R. B. Cone. The capital stock is $750,000.

Cumberland Valley.—A dispatch from Carlisle, Pa., states that as a result of the Philadelphia & Reading's purchase of the Gettysburg & Harrisburg this road is likely to build a line from the terminus of its Dillsburg branch to Gettysburg, Pa. This new line will be about eight miles long and it will complete a route from Harrisburg to Gettysburg, about 36 miles long, and shorter than the present route.

Delaware, Susquehanna & Schuylkill.—The recent agreement between the Philadelphia & Reading and Coxe Bros., the anthracite coal miners and shippers, has brought this road, which is the property of Coxe Bros., into public notice, on account of its important position in the contract as the originating and differential line. The dispatches state that 41 miles of the road has been completed. All this track was laid this year, and nearly all the grading also has been completed since January, for very little work beyond surveying had been done before that date. As many men as could be profitably worked on the road have been employed, and Brown Bros. & Co., the principal contractors, have had a force of 400 men working under them during the spring. The route was given in these columns in January, but is republished. The main line of the road extends from Drifton southwest to Gowen, Pa., 35¼ miles. This line reaches the towns of Eckley, Stockton, Hazleton, Tomhicken, and Deringer, between the terminal stations. There are branches from Stockton to Beaver Meadow, 2 miles, and from Hazleton to Oneida and Nelson City, 4.0 miles.

Duluth & Winnipeg.—Donald Grant, who has the contract for the construction of the line from Cloquet to Duluth, states that there are now 1,500 men and 250 teams working at grading and bridging the 16 miles of road from Cloquet to the connection with the St. Paul & Duluth road in the western suburbs. The work is being pushed with all possible speed.

Duluth, Mesabi & Northern.—The company filed articles of incorporation in Minnesota May 26. The capital stock is $5,000,000. The company propose to build a line from some navigable point on Lake Superior, St. Louis Bay or the St. Louis River to some point on the northern boundary of the state, to be determined hereafter.

Fall River Electric Freight.—The aldermen of Fall River, Mass., have granted the company the right of way for its tracks in the streets of Fall River. The difficulties connected with the legal organization of the company and in securing the charter and the right of way have been nearly overcome, and probably the grading on the line will begin shortly. The company proposes to build about 20 miles of road to connect with the different mills in Fall River to carry their freight. The project was described on page 212, of our issue of March 27.

Florence Northern.—One of the executive officers states that the directors expect to resume active construction work again about July 1. The grading has been suspended for over a year. About 25 miles has been graded. It is proposed to complete the first 27 miles northward from Florence, Ala., this fall, and to have that section in operation early in December. The balance of the line to Linden, Tenn., 46 miles, it is proposed to build in the first six months of 1892.

Florida.—Bills have been introduced in the state legislature to incorporate the Punta Rassa, Pearl Creek & Alafia, the Alabama, Florida & Mississippi and the Georgia, Florida & Key West, to further amend the land grant of the Georgia Southern & Florida and for a land grant to the Orlando & Mosquito road.

Georgetown & Granger.—Bids have been asked for grading the first 16 miles of this road, from the connection with the Missouri, Kansas & Texas, at Granger, in Williamson County, southwest to Georgetown, Tex. The bids are to be opened June 10. E. Taylor, of Georgetown, is President.

Great Northern.—Corey Bros. & Co., of Ogden, Utah, who have contracts under Shepard, Siems & Co., of St. Paul, for building 100 miles of the Pacific Coast extension, have about 800 men and 250 teams working on the clearing and grading. Their contract is in the northwest of Montana, their present headquarters being at Demersville, in Missoula County, Mont.

Hoffman & Troy.—The company was organized at Raleigh, N. C., last week and Leonidas M. Jones, of Moore County, was elected President. It is proposed to build a road about 30 miles long from Hoffman on the Raleigh & Augusta northwest through Richmond, Moore, and Montgomery Counties to Troy, N. C.

Irondale, Bancroft & Ottawa.—The company is building an extension of its present line from Irondale to Monmouth, Ont., a distance of about 10 miles. The construction work is being done by the company's forces. The grading will probably be finished in a few weeks.

Kansas City, Watkins & Gulf.—W. A. Daling, Assistant Engineer, is making a second preliminary survey for the line north of the Red River to Winn Parish, a distance of 45 miles from Alexandria, La.

Lake Temiscamingue.—This company is applying to Parliament for power to extend its line to Lake Temiscamingue, Que., and to lease its road to the Canadian Pacific or to amalgamate with it.

Lake Hopatcong.—The organization of the company which proposes to build the road from near Morristown to Lake Hopatcong, N. J., was completed this week. It was voted that the capital stock of the company be placed at $500,000. The estimated cost of constructing the road, including right of way, is $480,000. The work of raising capital to begin operations will be begun at once.

Manhattan (Elevated).—The stockholders of the road have voted to increase the capital stock by $4,000,000, the same to be used in acquiring the property of the Suburban Rapid Transit Co.

Mexican Western.—The corporation papers were filed at Denver, Col., May 23, with a capitalization of $2,000,000. The incorporators are John H. Rice and John W. Lovell, of New York, Charles W. Lovell, Edward W. Hussey and F. R. Kellogg, of Brooklyn, and A. K. Owen of Chester, Pa. The object of the company is to build under the concessions made by the Mexican Government to A. K. Owen, for a road from Topolobampo or Pacific City, on the Gulf of California, to Presidio De Rio Grande, in the Mexican State of Coahuila, on the Rio Grande River.

Montfort Colonization.—The Quebec Provincial Government has granted a subsidy of $7,000 per mile for this road through the Counties of Terrebonne and Argenteuil, and from St. Sauveur, on the Great Northern, to Montfort, Que., about 63 miles. The Dominion Government will be asked to grant a subsidy of $4,000 per mile.

New Roads.—A project to build a road from Union City to Huntington, Ind., in which Allison, Shaffer & Co., contractors, of Louisville, are interested, was set afoot at a popular meeting held in Montpelier, Ind., May 21. The following board of directors was elected: F. H. Allison, C. J. Allison, J. J. Shaffer, J. C. Fawcett, George L. Danforth, C. W. Pierce, A. Lupton, J. J. M. Lafollette and G. A. Mason. They say that the road will be built this year if the bonuses they ask are raised. The road will be about 60 miles long from Union City, in Randolph County, at the Ohio state line, northwesterly, crossing several roads to Huntington.

The engineers completed the survey last week for the proposed cut-o ffroad from Marion northwest to Duquoin, Ill., 25 miles, which is to connect two lines of the St. Louis, Alton & Terre Haute. A practical route was found, but there is little prospect of the line being built this year.

Several estimates have been made by contractors for building a road from a point on the Texas & Pacific, near Bunkie, La., east to Evergreen, and north to Marksville, near the Red River east of Alexandria. The line will be 20 miles long.

New York, New Haven & Hartford.—The work of laying the additional tracks on the New York and Shore Line divisions has been continued during the spring. The work is necessarily slow, and it has not been considered desirable to employ as large a force on the work as could be done. The work on the New York Division is the laying of quadruple track, and on the Shore Line Division double track. Considerable new track has been laid on the latter division which is in use but only to take the place of the original track, which is to be changed as to line and grade before it can be put into actual service; and also considerable track on the New York Division, but no part of this track is in service as yet either for new double track on the Shore Line Division or for quadruple track on the New York Division, and it probably will not be yet for three or four months, so that the double track now in use on the Shore Line Division, or the quadruple track on the New York Division, is of no greater extent than in January last. The connection with the Suburban Rapid Transit Co.'s road, at Harlem River, in New York City, will probably be partially completed this week, at least so that it can be put in service, but the station and the whole work will not be completed before October.

New York & New Jersey Terminal.—The company has applied to the Commissioners of the New York State Land Office for right of way for that part of its proposed railroad tunnel under the Hudson River from West Fourteenth street, New York City, to the New Jersey shore. The tunnel is to be 74 ft. beneath the mean high tide of the river. The application is made by Thomas Sturges, Vice-President.

New York, Ontario & Western.—The Zig Zag tunnel through the mountains between Walton and Sidney, N. Y., will be used for regular passenger service on June 15. The inner arching and tracklaying are about completed.

Norfolk & Western.—The Norfolk Councils have accepted the proposition of the railroad relating to the erection of a union station, the construction of a belt line at Norfolk, Va., etc. The company will expend about $750,000, and the city $40,000. The belt line will extend from Norfolk to Portsmouth. The other improvements to be made by the railroad are: The construction of large local freight house and of union passenger station with train shed 350 ft. long, and containing four tracks, an engine house and car shed; also an engine house and car repair shops at Lambert's Point. The estimated cost of the improvements is: Improvements at present terminals on East Main street, $250,000; belt line, $225,000; engine house, car repair shops, etc., at Lambert's Point, $125,000; total, $600,000.

Northern Pacific.—The contracts for clearing the right of way and grading for the second track between Tacoma and Puyallup, Wash., about nine miles, has been let to Griggs & Huestis, of Tacoma. The work will be very heavy. The contractors will put a large force at work within 10 days, and the work will be vigorously pushed.

Pennsylvania.—The first train over the Trenton cut-off road, the new Pennsylvania branch, was run last week between Morrisville and Norristown, Pa. The track has been laid on 42 miles of the road through Bucks and Montgomery counties, between the Delaware and Schuylkill Rivers. The entire line from Morrisville, opposite Trenton, N. J., to Frazer, about 14 miles from Norristown and southwest of Philadelphia, where the connection with the main line of the Pennsylvania is made, has been graded. The maximum grade is 29 ft. per mile and the maximum curvature is 1½ degrees. There are no grade crossings on the line, all the highways or railroad tracks being carried above or below the new road. The most important bridges are at the crossings of the Bound Brook road, the Philadelphia, Newtown & New York, the Northeast Pennsylvania, and the Philadelphia & Reading at the Schuylkill River. The bridges at the crossings are respectively 110 ft., 52 ft., 137 ft., and 807 ft. long. The general course of the route is southwesterly from the Delaware River, passing near, but north of Faltsington and Langhorne, south of Churchville, Hatboro and Fort Washington, and crossing the Schuylkill about two miles south of Norristown. From the Schuylkill the route is parallel to the Chester Valley road to the connection with the main line of the Pennsylvania at Frazer, and for several miles the road runs between the main line and the Chester Valley road.

A contract has been let for the completion of the seven mile line from Stewart's Station to Murraysville, Pa., to D. F. Keenan, of Philadelphia. This road was commenced five years ago, but was temporarily abandoned. The reason given now for the completion of the road is that certain large manufacturers have agreed to locate along the line when completed.

Trains are now running on the elevated tracks of the road through Jersey City, N. J., into the new train-shed in the city. The elevation of the roadway begins just east of the Point of Rocks in Bergen Hill, and is extended on solid embankments in part and in part on iron trestles into the new station. The Pennsylvania local trains and the trains of the New York, Susquehanna & Western and the Lehigh Valley will hereafter run on the elevated tracks. The Pennsylvania through trains will continue to run on the surface tracks for a week or two yet. The roof of the new trainshed is an unsupported iron span of 256 ft. It is 652 ft. long and 90 ft. to the centre of the span.

Pittsburgh, Shenango & Lake Erie.—The last track on the extension to Girard, Pa., on the New York, Chicago & St. Louis, was laid last week. The new steel bridge over Elk Creek, near Girard, has also been completed. Trains have begun running from the southern terminus at Butler to Girard, and will probably soon begin running to Erie over the tracks of the New York, Chicago & St. Louis. About 10 miles of track on the extension was laid last year from Greenville and about 25 miles since last January, from Dixonburg to Wallace Junction, near Girard.

Quebec & Lake St. John.—At a recent meeting of the shareholders in London the resolution of the directors that the construction of a line, starting from between Beauce Junction, in the township of St. Joseph, and Tring Station, in the township of Broughton, both in Beauce County, Que., to a connection with the Atlantic & Northwestern, which is leased to the Canadian Pacific, about Lake Megantic, in lieu of completing the Chaudiere Valley extension line from St. Francis beyond St. George's to the frontier in Beauce, be sanctioned, was carried. The subsidies granted by the Dominion and Provincial Governments to the former line have been transferred to the branch to the Maine State line near Lake Megantic.

Rapid City, Missouri & St. Paul.—The preliminary survey of the road has been completed to the Cheyenne river, and the line will be located early in June. Officers of the road have stated that a contract for grading the 45 miles to the Cheyenne river will be let immediately after it is located. It has not yet been decided where it will cross the Missouri River.

Ravenswood, Spencer & Glenville.—Stanley & Olds, who have the contract for grading this road, have about 400 men employed east of Leroy, to which point the road is in operation. Most of the work is completed between Leroy and Spencer, 16 miles, and the entire section will be ready for tracklaying by August. It is expected to lay the track in the autumn. The first 17 miles of the road, from Ravenswood to Leroy, was placed in operation a few weeks ago. East of Leroy the line is located along Sand Creek to Reedy, six miles, and on the north bank of Reed Creek for most of the balance of the distance to Spencer. No surveys have been made beyond the latter town, and it is proposed to make it the terminus. E. W. Clark & Co., of Philadelphia, offer for subscription, at 99 and accrued interest, $300,000 first mortgage six per cent. gold bonds of this road, the total authorized issue being $400,000, due in 1920. The bonds are secured by a first mortgage on the line from Ravenswood, on the Ohio River, to Spencer, in Roane County, 33 miles. This road is practically a branch of the Ohio River Railroad, by which company the bonds are guaranteed, both principal and interest.

Red River & Southwestern.—The contractors now have the grading completed from the connection with the Missouri, Kansas & Texas at Henrietta to a point in Archer County, within 15 miles of the town of Archer, Tex., the proposed southwestern terminus, about 30 miles from Henrietta. The line will not be in operation before September.

Seattle, Lake Shore & Eastern.—The proposed Blue Canon branch is to leave the northern branch about 1⅛ miles south of Ray Station, Wash., and extend northwestwardly, passing Park P. O., and then along the north shore of Lake Whatcom to the Blue Canon mine. A preliminary location has been made, but at present nothing is being done. The line will be about six miles long. The maximum grade is 80. ft. per mile maximum curves 8 degrees. The work is fairly light, with one or two heavy points.

Sherman, Denison & Dallas.—The company has filed at Dallas, Tex., a mortgage for $1,500,000 to secure an issue of 30-year first mortgage bonds, of which the Central Trust Co., of New York, is trustee.

Shuswap & Okanagan.—About 40 miles of this road has been graded from Sicamous, B. C., on the Canadian Pacific, south to the head of Okanagan Lake, a distance of 40 miles. About 300 men are employed on the balance of the line. The track has been laid for a distance of 22 miles south from Sicomous to Enderly. The total length of the line, from the junction of the Canadian Pacific to the terminus on Okanagan Lake, is 51 miles. T. W. Paterson & Co., of St. Catherines, Ont., have the contract for building the line. Ten miles of the road has been heavy rock work. The maximum grade is 57 ft. per mile, and the maximum curves are nine degrees. The road has been leased by the Canadian Pacific, and that company will operate it as soon as it is completed. The British Columbia Government has guaranteed four per cent. on the capital stock of $1,250,000.

South Bound.—The long trestle and the tracklaying on the Georgia side of the Savannah River near Savannah, Ga., have been completed, and the contractor is now building the trestle through the swamp on the opposite side. The latter work is very heavy, but it will doubtless be ready for the rails in July. Two of the piers of the bridge are built, and two others are nearly finished. The fifth and last pier is not yet above water. The railroad from the river to the crossing at the South Carolina road is nearly completed, and the track will be laid before the bridge and river trestle are finished. The road is expected to be ready for business as far as Graham's, on the South Carolina road, by Aug. 1. Every mile of the railroad from Graham's to Columbia is covered by contractors, and will be ready for the track by the time the other part of the road is in operation. The rails for that part of the railroad have been contracted for.

Southern Pacific.—The date of opening the entire Tracy extension to Armona, on the west side of the San Joaquin River, now depends on the completion of the bridge at Kings River. The last track has been laid, and the bridge builders at Kings River are the only construction forces now employed on the line. The bridge will probably not be completed before July. Four engines, each drawing 40 cars, and some 200 men are at work ballasting the road.

Tamaqua, Hazleton & Northern.—This is to be the name under which the Philadelphia & Reading is to construct its branch to connect with the road built by Coxe Bros. to their collieries in Luzerne County, Pa. The branch will connect with the Catawissa divison of the Reading near Lofty, and extend north to Hazleton, which is on one of the branches of Coxe Bros.' road. The engineers of the Reading began the survey to Hazleton this week. A route will probably be decided on in a few weeks, and then bids for building the branch will be called for. The Philadelphia & Reading is to build 10 miles of road under its agreement with Coxe Bros. for the transportation of the coal mined by the firm.

Toledo, Walhonding Valley & Ohio.—This company has been formed by the consolidation of the Northwestern Ohio, a Pennsylvania leased line, with the Walhonding Valley road, a projected line. The former road extends from Toledo Junction, near Mansfield, to Toledo, 80 miles. The latter line has been surveyed from Loudonville, on the Pennsylvania, southeast of Mansfield, to Kimbolton, 70 miles. The consolidated company has a capital stock of $4,000,000, and of this amount $2,400,000 is to be distributed to the stockholders of the Northwestern Ohio for their present stock and $100,000 to the stockholders of Walhonding Valley. The remainder of the authorized capital stock of the new company is to be applied topurposes of construction. A bonded indebtedness of $4,000,000 has been authorized.

Ulster & Delaware.—Trains are now running over the newly built eight-mile extension of the road from Hobart to Bloomville, N. Y. The matter of a further extension from Bloomville to Oneonta and a connection at that place with the Delaware & Hudson and New York, Ontario & Western roads is being actively canvassed.

Valley of Mexico.—The company has 400 men at work on the line in the valley south of the City of Mexico from San Angel to Tezompa and Contreras.

Western of Florida.—The locating survey for the proposed extension west of Melrose, Fla., the present terminus, will probably be commenced in a few weeks. Some surveying has already been done on the extension, and recently the Florida State Legislature passed a special charter for a line from Melrose west to Gainesville, a distance of about 20 miles, to connect with the Florida Central & Peninsular. It is the intention of the company to begin the construction of the road this year.

Wilmot & Tor Brook.—The construction of this road was commenced last week. When completed it will extend from Wilmot station, N. S., on the Windsor & Annapolis, to the Tor Brook iron mines. F. A. Clark & Sons, of Berwick, N. S., have the contract for the bridge across the Annapolis River. The contract price is said to be under $25,000.

GENERAL RAILROAD NEWS.

Boston & Maine.—The quarterly statement of earnings filed with the Massachusetts Railroad Commissioners gives the following figures:

Quarter to March 31.	1891.	1890.	Inc. or dec.
Gross earnings	$3,185,527	$3,153,552	I. $31,975
Oper. expenses	2,292,179	2,318,802	D. 26,623
Net earnings	$893,348	$834 750	I. $58,598
Other income	147,959	150,282	D. 2,323
Total net	$1,041,307	$985,032	I. $56.275
Fixed charges	971 049	933,760	D. 22,711
Balance	$70,258	Def $8,728	I. $78,986

SIX MONTHS—OCT. 1 TO MARCH 31.

	1890-91.	1889-90.	
Gross earnings	$6,964,578	$6,737,494	I. $227,084
Oper. expenses	4,846,068	4,638,142	I. 207,926
Net earnings	$2,118,510	$2,099.352	I. $19,158
Other income	228,791	212.722	I. 16,069
Total net	$2,347,302	$2,312 074	I. $35,228
Fixed charges	1,929,551	2,003,072	D. 73,521
Surplus	$417,751	$309,002	I. $108.746

Central of New Jersey.—The company reports gross earnings for April of $1,054,950, a decrease of $24,759 as compared with the same month of last year, and net $445,286, an increase of $22,665. For the four months ending April 30 the gross earnings were $4,106,775, an increase of $404,783 as compared with the corresponding period of last year, and net $1,650,236, an increase of $206,271.

Covington & Macon.—The road was sold in Macon, Ga., May 21, under a decree of foreclosure obtained by the Mercantile Trust Co. of New York. It was purchased by a committee on behalf of the bondholders for $100,000. The road is 107 miles long, extending from Macon north to Athens. It has been reorganized as the Covington & Northern and has been leased to the Central of Georgia, and that company will operate it.

Covington & Northern.—The Covington & Macon, which was sold at foreclosure last week, has been reorganized as the Covington & Northern by the bondholders. A new charter was filed in Georgia last week. Cecil Gabbett, General Manager of the Central of Georgia, has been appointed General Manager of this road also, and the Central of Georgia will practically assume control of the property under its lease immediately, although the formal transfer may be delayed some months.

Chicago, Rock Island & Pacific.—A mortgage for $31,000,000 in favor of the United States Trust Co., of New York City, is being filed in the counties in Nebraska through which the road extends.

Chicago & Western Indiana.—The Secretary of State of Illinois, on May 25, recorded a resolution of the stockholders of the company authorizing the directors to issue additional bonds of the company under its mortgage of Dec. 1, 1882, to the amount of $1,000,000, and bearing interest at the rate of six per cent., to enlarge and improve the property.

Choctaw Coal & Railroad Co.—The receivers have filed their report in the United States District Court, at South McAlester, Ind. Ter. It shows the total indebtedness of the company to be $2,756,000; total receipts, $593,860; disbursements, $564,088; balances, $29.717. Gross earnings for March were $35,131; net, $16,190; April, gross earnings, $56,946; net, $24,479. Approximate receipts first fifteen days of May, $30,000. The number of miles operated is 65; constructed, 108.

Evansville & Terre Haute.—At a meeting of the directors of the road last week it was stated by President Mackey that the surplus earnings since 1882 amounted to $1,240,000, which had been invested in branch lines and equipment, and which properly belonged to the stockholders. A resolution was passed giving the stockholders a million of stock, and also the privilege of subscribing for a million bonds now in the treasury at 80 cents on the dollar.

Lake Shore & Michigan Southern.—The following is a report of the earnings of the road for the three months to March 31:

	1891.	1890.	Inc. or dec.	
Gross earnings	$4,750,632	$4,905,897	D.	$155,265
Operating expenses	3,215,528	3,260,680	D.	45,153
Net earnings	$1,535,104	$1,645,217	D.	$110,112
Other income	104,625	104,818	D.	194
Total income	$1,639,729	$1,750,035	D.	$110,306
Fixed charges	1,069,125	1,069,318	D.	193
Surplus	$570,604	$680,717	D.	$110,113
Cash on hand	2,538,036	2,845,607	D.	307,571

The earnings for the last fiscal year were published May 15, page 346, but under the title of the New York, Chicago & St. Louis by an error.

Louisville & Nashville.—In the United States Circuit Court at Springfield, Ill., May 22, Charles H. Brownell, of Peru, Ind., filed a bill in chancery against the Louisville & Nashville, Louisville, Evansville & St. Louis, and Jacksonville, Louisville & St. Louis Southeastern roads, to foreclose a mortgage given to the Mercantile Trust Co., of New York, by the Louisville & Nashville for $247,000, to secure bonds issued for the construction of 17 miles of road between Centralia and Driver's, the latter being the point where the Jacksonville Southeastern and the Louisville & Nashville roads intersect. The appointment of a receiver is asked for the 17 miles of road in question.

Meadville & Linesville.—This Pennsylvania line was sold at foreclosure at Meadville, Pa., on May 23. It was purchased for 26,000 by W. S. Harper and G. S. Collum, who, it is understood represent the Pittsburgh, Shenango & Lake Erie, which crosses the road east of Linesville. It is 26 miles long, extending from Meadville west to Linesville, on the Erie & Pittsburgh.

New York, Chicago & St. Louis.—The earnings of the first quarter are as follows:

	1891.	1890.	Inc. or dec.	
Gross earnings	$1,570,946	$1,243,192	I.	$327,754
Operating expenses	1,220,316	978,457	I.	241,858
Net earnings	$350,630	$264,734	I.	$85,896
Other income	1,609	....	I.	1,609
Total income	$352,239	$264,734	I.	$87,505
Fixed charges	253,694	248,411	I.	5,283
Surplus	$98,545	$16,323	I.	$82,222
Cash	$766,603	$746,631	I.	$19,972

The statement of annual earnings published under this head two weeks ago was an obvious error. The earnings were those of the Lake Shore & Michigan Southern.

New York, Lake Erie & Western.—The following table shows the earnings of the company for April, 1890, and for the seven months, Oct. 1 to April 30, as compared with the corresponding periods of last year:

April:	1891.	1890.	Inc. or Dec.	
Gross earnings	$2,234,032	$2,345,757	D.	$111,725
Oper. expenses	1,499,975	1,566,244	D.	66,269
	$734,057	$779,513	D.	$45,456
Less proportions due leased lines	196,232	205,318	D.	9,086
Net earnings	$537,825	$574,195	D.	$36,370
Oct. 1 to April 30:				
Gross earnings	$16,356,792	$16,272,551	I.	$84,241
Oper. expenses	10,980,079	10,740,854	I.	239,225
	$5,376,713	$5,531,697	D.	$154,984
Less proportions due leased lines	1,459,388	1,483,855	D.	24,468
Net earnings	$3,917,325	$4,047,842	D.	$130,516

Northern Pacific.—The directors have, it is reported, approved the terms of the agreement with the Baltimore & Ohio for the use by that road of the Chicago terminal facilities of the Northern Pacific. There is yet to be a formal ratification by the Chicago & Northern Pacific, the corporation owning the terminal property and controlled by the Northern Pacific. It is not known when the Baltimore & Ohio will begin the actual use of the tracks under the agreement. A director said last week that the terms of the agreement would bring the Northern Pacific a sum equal to about two per cent. upon the bonds of the Chicago & Northern Pacific.

Pennsylvania.—The statement of the business of all lines of the Pennsylvania is as follows: All lines east of Pittsburgh and Erie for April, 1891, compared with the same month in 1890, show a decrease in gross earnings of $240,354; a decrease in expenses of $161,117; a decrease in net earnings of $79,237. The four months of 1891, compared with the same period of 1890, show a decrease in gross earnings of $433,970; a decrease in expenses of $329,899; a decrease in net earnings of $104,071. All lines west of Pittsburgh and Erie for April, 1891, compared with 1890, show a decrease in gross earnings of $85,723; a decrease in expenses of $416,438; an increase in net earnings of $330,715. The four months of 1891, compared with the same period of 1890, show a decrease in gross earnings of $947,091; a decrease in expenses of $973,292; an increase in net earnings of $26,201.

In the Pennsylvania State tax case against this company, in which an opinion was handed down by the Court recently, the statement of the amount due the State was filed at Harrisburg, Pa., May 25, showing the tax which the company must pay to be $416,500.

Philadelphia & Reading.—The company's statement of the business for the month of April, 1891, as compared with the same month of 1890, is as follows:

April.	1891.	1890.	Inc. or dec.	
Traffic.				
Gross receipts	$1,610,326	$1,676,996	D.	$65,669
Gross expenses	923,871	996,601	D.	72,729
Profit in operating	686,454	680,394	I.	6,059
Other sources.				
Net receipts	35,498	42,281	D.	6,783
Profit for month	721,953	722,676	D.	723
Expend. for perm. improv.	59,145	49,119	I.	10,025
One-twelfth fixed charges.	615,982	598,504	I.	17,378
Surplus	675,327	647,923	I.	27,403
	46,625	74,732	D.	28,127
Fiscal year to April 30.				
Traffic.				
Gross receipts	$8,030,844	$7,721,046	I.	$309,797
Gross expenses	4,740,905	4,770,205	D.	20,299
Profit in operating	3,289,938	2,950,841	I.	339,096
Other Sources.				
Net receipts	191,030	167,145	I.	23,884
Profit for month	3,480,968	3,117,987	I.	362,981
Expend. for perm. improv.	243,123	360,462	D.	117,339
One-twelfth fixed charges	3,081,263	2,992,523	I.	88,745
	3,321,391	3,352,985	D.	22,593
Surplus	156,576	def. 234,998	I.	391,575

The railroad and Coal and Iron Companies, taken together, show $101,838 deficit for April and $494,544 deficit for the five months of the fiscal year that has passed. Compared with the previous year this shows a loss of $3,694 for April and a gain of $425,366 for the five months.

Pittsburgh & Western.—At the adjourned meeting of the stockholders in Allegheny last week it was decided to issue $2,000,000 of bonds. The money from the sale of the bonds will be used in improving the road, double-tracking, enlarging the stations and increasing facilities for business. The road will be operated by the Baltimore & Ohio, and that company guarantees the interest on the bonds.

Western & Atlantic.—The Commission appointed by the Georgia Legislature to pass upon the claims of the former lessees of the road, which is the State's property, against the State for betterments and other claims, rendered a decision this week awarding to the lessees $96,400.

Western Maryland.—Notwithstanding the decision of the City Finance Commissioners of Baltimore to entertain no more propositions for the sale of the stock of this road which it holds, General Bryant, of New York, and his associates have again asked the Ways and Means Committee of City Councils to grant a new hearing. It is now represented that he has raised his bid for thecity's interests in the road from $1,500,000 to $1,875,000.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, May 27, 1891.

As predicted in my letter last week, the Alton defends its position in refusing to advance the St. Louis-Chicago and Kansas City-St. Louis rates as ordered by Chairman Finley, by denying the right of the chairman to order the advance. Chairman Finley claims that it was not an advance, but a restoration of the rates which were reduced by order of the Association with instructions to him to restore them when he was satisfied that the cause for the reduction was removed. The Alton further denies that the cause was removed when the restoration was ordered, claiming that there were blocks of tickets then on the market tending to demoralize the situation, and that for this reason and for the further reason that it was being boycotted by the Eastern roads, that equality which the Association guarantees its members could not be secured by advancing the rates at the present time.

The action taken by the Board of Commissioners of the Western Traffic Association May 19 prohibiting the making of through rates by combining association rates with cut rates quoted by Eastern connections has already borne fruit and has resulted in a lively stirring up of the wool rates eastbound. The decision was supplemented by a circular by Chairman Midgley, of the Lake Division and the Western Freight Association, calling attention to the ruling, "for the purpose of giving members opportunity to promptly recall any and all action that may possibly have been taken contrary to the ruling, . . . as the continuance of such acts would necessarily be regarded as in violation of the agreement of the Western Traffic Association." In this circular the following significant statement is made:

It would appear that the Association, while undertaking strictly to maintain their rates on shipments of wool, have felt at liberty to inform shippers of through rates to the seaboard, which might be obtained by adding to the Association rates as far east as the Mississippi River or Chicago, reduced prices quietly offered by Eastern connections, whether lake and rail or all rail.

The all-rail rates from Chicago on wool, as published by the Eastern lines, are on the basis of 65 cents per 100 pounds to New York. The published lake and rail rates are on the basis of 52 cents. Inquiry of the Interstate Commerce Commission elicited the information that the Lehigh Valley Transportation Co. had filed a tariff, effective May 25, reducing the rates from Chicago to New York to 40 cents; Philadelphia, 38; Boston, 45. The Western Transit Co. at once filed the same rates, effective May 25, and Chairman Midgley at once authorized the members of the Western Freight Association to use these rates. On Monday, notice was received of a further reduction by the Lehigh Valley to the basis of 36 cents, Chicago to New York. These rates were accordingly authorized for use in the Western Freight Association.

A misunderstanding has arisen between the Western Passenger Association and the New England roads in regard to the routing of passengers to the coming meeting of the Society of Christian Endeavor at Minneapolis. The Association decided to route this business via the Burlington, Northwestern and Albert Lea routes, under their agreement for the division of competitive business in the Northwest. The New England roads refused to be bound by this agreement, but it is thought that when they fully understand the matter they will withdraw their objections.

The Board of Commissioners of the Western Traffic Association has just issued two decisions of more than usual interest. The first, referred to above, ends as follows:

"In the opinion of the Commissioners through rates cannot properly be made otherwise than by the publication of a through tariff, naming rates from point of shipment to destination, or by the addition of regular published rates to and from some intermediate basing point or points. . . ."

The other relates to exclusive contracts with shippers, and is a decision under a complaint brought by the Northern Pacific for relief from the effect of special contracts made by the steamship lines of the Union Pacific. It is as follows (condensed):

It appears that contracts have been made for transportation of freight not covered by the by-laws of this Association, in which contracts the provision is made that the shippers shall ship by the Union Pacific system *all freight* from or to any points reached by said system. In the opinion of the board such contracts constitute an obstacle to a fair division of competitive traffic. Acting under the authority conferred by Section 1 of Article VII, the Commissioners record their decision that this provision in all existing contracts shall be promptly canceled, and that no concessions or agreements shall be made in respect to other business than that covered by the Western Traffic Association agreement which may have the effect of influencing the distribution of business subject to the agreement.

The Western Passenger Association held a meeting Monday and agreed upon a scale for summer tourist rates, based on 80 per cent. of the tariff rate each way.

Traffic Notes.

The East Tennessee, Virginia & Georgia has postponed its withdrawal from the Southern Railway & Steamship Association.

The Poughkeepsie Bridge route asks the New England connections of the trunk lines to grant it a differential on through westbound freight.

The Kanawha Dispatch, which takes freight from Boston to the West by means of steamship lines to Newport News, has issued a freight tariff based on 50 cents, first-class, from Boston to St. Louis.

The lines leading from St. Louis eastward held a meeting in New York last week to discuss the organization of an eastbound division-of-traffic scheme, but no progress was made.

The Car Service Association of Georgia has begun operations, with headquarters at Atlanta. E. H. Barnes, lately Superintendent of the Georgia Division of the East Tennessee, Virginia & Georgia, is the Manager.

There is now through sleeping-car service between New York and New Orleans, via the Pennsylvania, Cumberland Valley, Norfolk & Western, East Tennessee, Virginia & Georgia and Queen & Crescent roads.

The Central Traffic Association has appointed a special eastbound freight committee, consisting of traffic officers of nine of the principal roads. It is expected that this committee will be able to deal with a large number of questions which heretofore have had to be deferred to a general meeting of the association.

The National Transportation Association (associated boards of trade) at a meeting in Chicago last week adopted a form for a uniform bill of lading containing no conditions whatever, and appointed a committee to go before the Interstate Commerce Commission and urge its ratification and to work for its adoption by the roads.

The Chicago shippers of dressed beef, live stock and other commodities, who have been asked by the railroads to co-operate in a division of shipments between the different lines, have expressed conditional approval of the movement, but will first consult with shippers at other important points, with a view to spreading the proposed agreement over a larger territory.

The Lehigh Valley continues to charge the old rates on coal from the anthracite region to tidewater, and Coxe Bros. & Co., who complained of the rates, have made a contract throwing a large share of their tonnage over to the Philadelphia & Reading, as noted in another column of this paper. President McLeod says, however, that the contract has been the subject of negotiations for a long time.

Traffic of Canadian Canals.

The annual report of the Dominion Minister of Railways and Canals has just been presented to Parliament. The revenue for the year decreased $33,000 from 1889, $24,000 of which was on the Welland Canal. The refunds of tolls on grain passing through the Welland amounted to $61,635. Of the 245,932 tons of grain passing through the Welland destined for United States ports, 16,433 tons were shipped at Ogdensburg and passed down to Montreal, upon which the refund of 18 cents a ton was made to apply. The shipment of oats to Europe via the St. Lawrence only amounted last year to 210,000 bushels. The quantity of oats through the Welland from United States ports to United States ports was 1,590,000 bushels, a decrease of 27,000 bushels from 1889. From the figures given it is seen that the quantity of grain passing down the Welland Canal from United States ports to United States ports has steadily increased each year from 47,029 tons in 1880 to 245,932 tons in 1890. The quantity to Montreal, 228,513, shows a decrease of 39,256 tons for 1890 from the previous year and 104,293 tons less than in 1880. The amount of grain arriving at Montreal by the railroads was 119,208 tons, an increase of 25,000 over 1889 and a decrease of 72,000 tons below 1887. On the St. Lawrence canals, the total quantity of freight moved was 853,853 tons, of which 319,670 tons were agricultural products and 332,671 tons merchandise. On the Ottawa canals the total quantity moved was 651,355 tons, of which 633,982 tons was the products of the forest. The Canadian Pacific and Canada Atlantic railroads have become formidable competitors to the Ottawa canals for the carrying of lumber from the Ottawa district.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, May 23, amounted to 40,742 tons, against 49,611 tons during the preceding week, a decrease of 8,869 tons. The proportions carried by each road were:

	Wk. to May 23.		Wk. to May 16.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	5,818	14.3	7,929	16.0
Wabash	2,792	6.8	2,574	5.2
Lake Shore & Michigan South.	5,905	14.5	6,085	12.3
Pitts., Ft. Wayne & Chicago	4,488	11.0	6,290	12.7
Chicago, St. Louis & Pitts.	5,576	13.7	8,141	16.4
Baltimore & Ohio	2,961	7.3	2,878	5.8
Chicago & Grand Trunk	3,085	7.6	4,267	8.6
New York, Chic. & St. Louis	4,282	10.5	6,158	12.4
Chicago & Atlantic	5,835	14.3	5,280	10.6
Total	40,742	100.0	49,611	100.0

Of the above shipments 1,462 tons were flour, 13,417 tons grain, 2,989 tons cured meats, 7,246 tons dressed beef, 1,214 tons hides, and 6,384 tons lumber. The three Vanderbilt lines together carried 39.3 per cent., while the two Pennsylvania lines carried but 24.7 per cent.